THE NATIONAL FOREST MAPPING PROJECT

A report for the

National Mapping Programme

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A REPORT FOR THE NATIONAL MAPPING PROGRAMME

DAVID MACLEOD

AIR PHOTOGRAPHY UNIT

ROYAL COMMISSION ON THE HISTORIC MONUMENTS OF ENGLAND

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CONTENTS

List of Illustrations

1 SUMMARY

This report covers the air photograph transcriptions and accompanying MORPH2 database, produced by members of the Royal Commission on the Historic Monuments of England (RCHME) Air Photography Unit (APU) to National Mapping Programme (NMP) standards, for the area known as the National Forest. The work was done as part of the multi-disciplinary RCHME: National Forest Project, an initiative of the Keele field section. The over all aim of the project was to produce, to a uniformly high standard, an archaeological data set for the forest, derived from a combination of documentary research, air photograph interpretation and field survey (For a fuller introduction to the project see the Summary and Introduction to Jecock, M. and MacLeod, D., 1993). The particular aim of the APU transcription exercise was to sketch plot to a consistent standard, all archaeology visible on air photographs. This latter exercise generated 2385 records in the supporting MORPH2 database, over 1400 of which were previously unaccounted for in the county Sites and Monuments Records (SMRs) or in the National Monuments Record (NMR).

The report is intended as a guide to the archaeology visible on air photographs and as such is only concerned with the APU part of the RCHME: National Forest project. All analyses are based solely on information in the MORPH2 database, Map Note Sheets and - inked overlays unless explicitly stated otherwise. The report aims to be an introduction and overview to the information available in these sources. The report does not aim to be a summary of the archaeology of the project area, but some pointers and suggestions for further archaeological work will be suggested. The report was written by David MacLeod and the opinions expressed in it are largely his own. The report should be used in conjunction with the 1: 10,000 transcription overlays and the MORPH2 database (and MONARCH once the data is available therein). The primary level of the survey involved means that wherever possible it would be advisable to go back to original sources (photographs) where detailed analysis is to take place rather than be wholly reliant on the interpretations and descriptions provided.

All references to records, and most of the capitalised terms e.g. GROUPS and SITES, relate to MORPH2 terminology unless otherwise stated. Reference to the MORPH2 Users Guide will be useful, particularly when reading section 4 - Results.

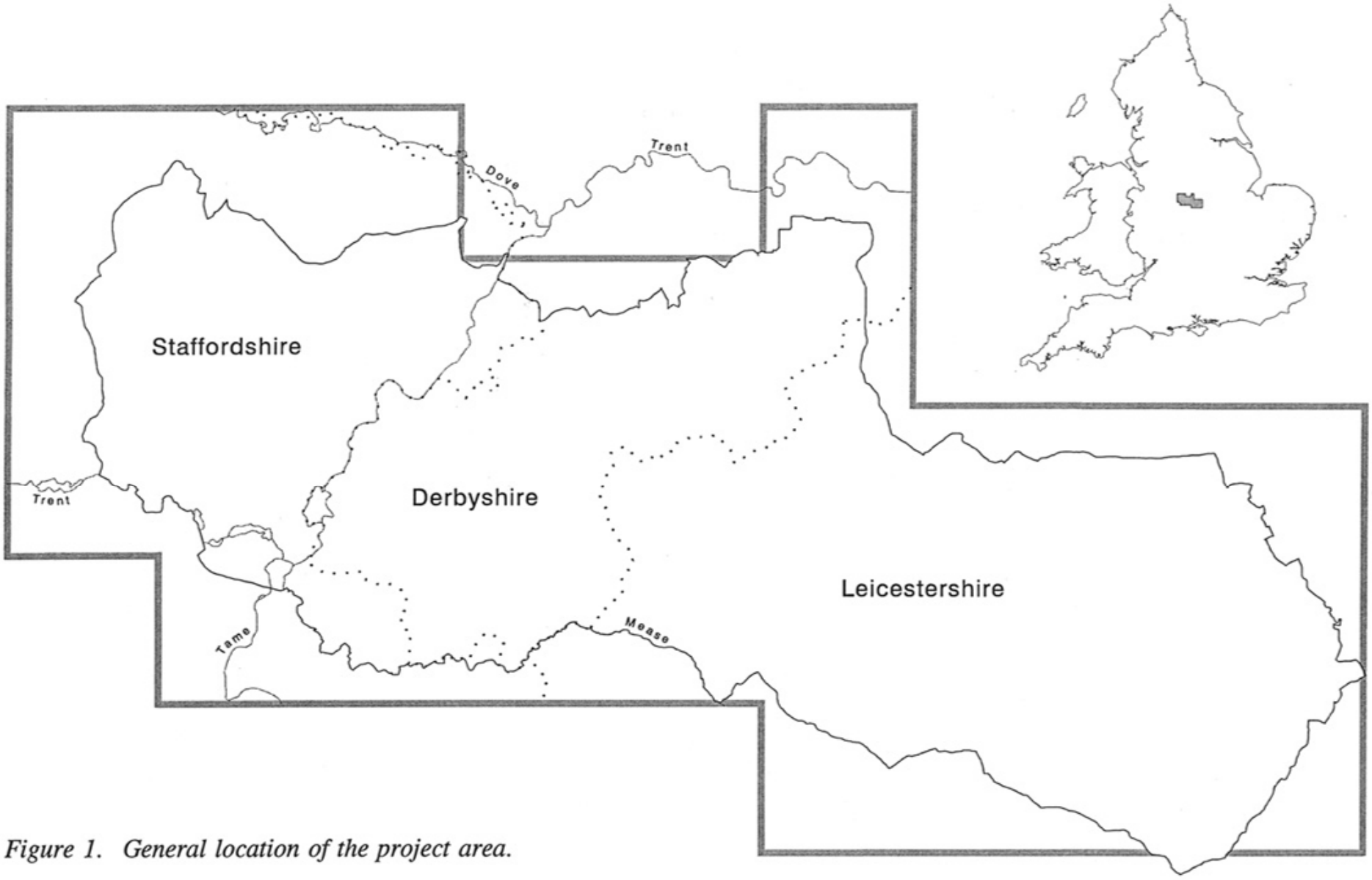

Figure 1. General location of the project area.

2 INTRODUCTION

2.1 BACKGROUND TO THE PROJECT

The idea of creating a National Forest or "forest for the nation" was proposed by the Countryside Commission in 1987. In 1991 the Commission announced the location of the Forest and stated their intention to create a "mosaic of farms, woods, towns and villages" in accordance with their commitment to "multi-purpose forestry" which combines timber production with recreation, alternative land use and the general enhancement of the landscape. The Forest encompasses many derelict industrial landscapes and it is assumed that much of the intended tree planting will be used to reclaim these, posing a major threat to the industrial heritage of the area.

The Countryside Commission appointed a Development Team to formulate a strategy for the Forest and as part of their research the team commissioned a report from Land Use Consultants (LUC, 1992) in association with Dr Della Hook, detailing the archaeological resource of the area. The LUC report was based solely on the three county SMRs (Staffordshire, Derbyshire and Leicestershire) each with a different terminal cut off date and all acknowledging poor coverage of their industrial remains. The counties' past treatment of their aerial photographic resources is also very varied both in the quality of their transcriptions and in the degree to which such information has been incorporated into the SMRs (see 3.1).

It was against this background that the Keele field section conceived the National Forest Project with the aim of offering the Countryside Commission's Management Team "reliable high quality information, to a common standard across (the) three counties" (Jecock, M. and MacLeod, D., 1993)

2.2 OBJECTIVES

The general aims and objectives of the National Mapping Programme are set out in the National Programme of Archaeological Recording from Air Photographs. (p.7). These are to identify and transcribe ... "all probable and possible archaeological features showing as crop marks or soil marks and previously unsurveyed earthworks (with the exception of extensive systems of Medieval ridge and furrow ploughing) ... " up to the NAR terminal recording date of 1945.

The area defined by the Countryside Commission and called the National Forest, describes an irregular oblong approximately 43 km x 12 km running WNW - ESE and lies across parts of Staffordshire, Leicestershire and the southern tip of Derbyshire (fig. 1). The National Forest encompasses several urban nuclei e.g. Burton-upon-Trent, Swadlincote, Ashby de la Zouch and Coalville, and the ancient forests of Needwood and Charnwood at its eastern and western extremities respectively (plastic overlay enclosed).

In line with NMP policy the whole of each 1: 10,000 map listed was surveyed (see appendix 7.4). Five maps where the Forest covered less than 4% (1 km square) of their area, were excluded though the small areas lying within the Forest were checked. Eleven of the total 31 maps completed lay less than 50% within the area of the Forest. This means that a total area of 775 km2 square was surveyed for the

aerial photographic transcription, of which approximately 177 km2 (23 %) lay outside the boundaries of the National Forest.

2.3 SOURCES

The main source of specialist aerial photographs was the RCHME's National Library of Air Photographs (NLAP) which supplied 2,435 prints to the project team. The NLAP also supplied over 5,000 non-specialist, vertical aerial photographs to the project. The Cambridge University Committee for Air Photography (CUCAP) allowed the postal borrowing of 236 specialist photographs from their collection. No attempt was made to access the county held photographs of the three SMRs which cover the project area because preliminary assessments suggested that very little of this would prove to be unique. Subsequently forty sites were sourced to the SMR transcriptions, the photography from which they were originally transcribed, not being available to the project team.

For practical purposes it can be assumed that the only photography used from the sources listed above will have had accession dates prior to the start of the project (November 1993).

2.4 METHODOLOGY

2.4.1 Mapping methods

The transcription was carried out as a level 2 sketch, or manual, survey (RCHME forthcoming document). For this project this meant a locational tolerance of 5 m to 20 m; most of the project area offered good control but in the Trent valley many field boundaries had been removed making accurate siting difficult. Only in this area was the plane transformation software AERIAL used to plot archaeological frameworks as an aid to the sketch plotting process. ..

2.4.2 Conventions

The cartographic conventions used in the project were those devised for the NMP and conform to the 1:10,000 scale conventions as published in RCHME Cartographic Conventions Standards (RCHME forthcoming. See appendix 7.7). The standard pen size was changed part way through the project from ISO 0.13 to 0.18 to conform to the new standards as set out in the above document .

2.4.3 Databases

The digital record consists of the MORPH2, project databases. "The MORPH2 classification system is a suite of programs that manage a number of related databases providing a closely structured method of describing archaeological features .... The database structure conforms to the Dbase3 standard, the programs are run using FOXR (the runtime version of FoxPro), and the indexes are of the FoxPro type" (MORPH2 Users Guide, appendix C.1). The sizes and currency of the MORPH2 databases are listed in appendix 7.3

A separate database called C:\FOX\NMP\FOREST\MAPS was used to monitor transcription progress map by map and to record quantification data such as numbers of NAR records and numbers of photographs (see appendix 7.3)

2.5 ARCHIVING/PUBLICATION DETAILS

Items relating to this transcription project will be archived as part of The RCHME: National Forest Project Archive and will include the following: Project texts e.g. project design and specification; aerial photograph transcription overlays, in ink and pencil; Map note sheets as specified under NMP, one pc:!r map sheet; digital copy of the MORPH2 databases and the MAPS database (see appendix 7.3 for a complete list). Copies of the transcriptions, the map note sheets and a digital copy of the MORPH2 database are also held by the APU Northern office and will be available for consultation.

It is intended that the MORPH2 database will be fully concorded with, and used to update, MONARCH the new NMR database.

Each of the three counties will receive copies of the ink aerial photograph transcriptions and the Map Note sheets for their area. The MORPH2 data will only be available to the county SMRs through the updated MONARCH database .

Currently there are no plans for the external publication of project data . 5

2.6 PROJECT DETAILS

2.6.1 Project team structure

The project team consisted of two grade F Air Photo Interpretation officers (Yvonne Boutwood and Antonia Kershaw) who carried out most of the transcription work and a grade E Senior Air Photo Interpretation officer (David MacLeod) in a primarily supervisory role. The overall National Forest Project was managed from the Keele office on a part-time basis by a grade E officer (Marcus Jecock) under the nominal supervision of a grade 7 (Paul Everson).

2.6.2 Timetable / man-days

The original timetable for the transcription project allowed 12 man-months (two six month contracts) for the completion of 36 1: 10,000 quarter sheets, to run from early October 1992 to March 1993. The two grade F posts were not in fact filled until the end of October and after an intensive three week training course in aerial photograph interpretation the new members of staff began project work on the 23rd of November. During the first month of the project the team carried out a quantification exercise which resulted in the project deadline being moved to the end of July 1993. The project was subsequently completed to the revised deadline to a total of 395.5 man-days of which 271.5 man-days were spent mapping and MORPHing.

2.7 FUNDING

All funding for the project was made available by the RCHME. All costs for the curatorial F officers were met from the National Forest Project budget administered by the Keele office while costs for the curatorial E officer were met by the APU.

3 BACKGROUND TO THE ARCHAEOLOGY/AREA

3.1 PREVIOUS ·WORK

3.1.1 NAR record

The NAR record for the 31 maps in the project area (542 records) was essentially based on the Ordnance Survey (OS) record cards to which updates had been addled in the late 80's / early 90's as part of the NAR's Primary Recording Programme. As the first stage of the National Forest Project, 515 records had been created by the Keele Office for industrial sites (and previously unrecorded parkland) identified on 1st edition OS 6" maps.

The Excavations Index for the project area listed 25 excavations (this does not include multiple excavations on the same site), only 11 of these coincided with transcribed features. Among the excavated sites lying within the project area are the Anglo-Saxon settlement at Catholme; Bronze Age cemetery, Swarkestone Lows; Bronze and Iron Age settlement at Fatholme; Roman farmstead, Fisherwick; Calke Abbey.

The Countryside Commission National Forest Management Team contracted Land Use Consultants in association with Dr. Della Hooke to conduct an archaeological and historical study of the area. The sources used by LUC were " ... the Sites and Monuments Record held by ... each county, ... the records of listed buildings and from other records of, for example, parklands. Other information on parklands has been drawn from the English Heritage register of important historic gardens and designed landscapes, and from analysis of the 1991 colour aerial photographs" (LUC 1992). The LUC summary report (April 1992) and county based schedules of sites (February 1992) were available; but being essentially SMR summaries, were of no practical value to the project team. The report, as delivered to the Management team, was accompanied by colour coded maps and overlays but these were not available to us.

3.1.2 SMR records

Staffordshire - Provided a full SMR printout with sources and copies of their 1: 10,000 aerial photograph transcriptions. No Quantification Assessment of aerial photographs was available.

Derbyshire - Provided a full SMR printout and transcriptions of the aerial photographs for the county carried out in 1989 -1990. At the same time a quantification assessment was carried out the results of which were already held by the APU. 7

Leicestershire - Provided a list of archaeological crop marks (no sources) and copies of their "Air Photo Plan" record sheets which included sketch transcriptions at 1: 10,000 and some references to sources, though these were sometimes inconsistent or missing. No Quantification Assessment of the aerial photographs was available.

3.1.3 Air Photographs

3.1.3.1 Archaeological air survey

The specialist oblique photographic cover for the Forest was heavily biased in its distribution with a vast majority of the photos sited within the Trent flood plain (figure 4, a distribution of all crop-mark sites, reflects the specialist cover for the project area). There was one other relatively insignificant cluster of photographs around SK 3810. Other than that there was a very light and fairly even scatter of specialist photographs throughout the project area. NLAP supplied 2435 photographs to the project and CUCAP 236. A small but unquantified number of those from the NLAP were copies of CUCAP photographs. These duplicates are counted in the totals from both sources since these refer to numbers of photographs supplied. NMR photography was limited to sporadic reconnaissance in 1980, '83, '84 and '87. Targeted reconnaissance to photograph coal mines was carried out for the NMR in the early '90s. Over 70% of the obliques supplied by NLAP were taken by J. Pickering between 1964 and 1986 (all years except 1985). With the exception of a few 1990 photographs NLAP did not hold copies of Pickering films for the project area after the above period. Other photographers who have been active in the area are; R. Hartley, various years since 1979; W.A. Baker, early 1970s; D.N. Riley, 1985, 1991; and CUCAP, various years from 1950 to 1976.

Staffordshire - The SMR transcription used NLAP (obliques only) and the private collection of J. Pickering (35 mm natural colour transparencies) but did not access the CUCAP material. The SMR did not hold an aerial photograph collection so photographs had to be recalled from their original sources. This presented a problem with the Pickering material which for historic reasons was not accessible directly. Some of the Pickering photographs were available through NLAP but the extensive CUCAP photography of the Trent valley was relied on to provide cover of those sites transcribed by the county solely on the evidence of the Pickering collection. Ultimately 12 SMR sites could not be assessed by the project team from the available photography.

Derbyshire - This was the only county for which a Quantification Assessment of the aerial photograph resources (joint funded with RCHME) had been carried out. The Quantification Assessment was done in 1990 as part of a transcription project, but actual figures were not available for individual quarter sheets so it was only of limited use in quantifying the resource for the Forest. The sources identified in the report on the above project and of relevance to the Forest are NLAP, CUCAP. and the collections of R.F.Hartley and J. Pickering. The majority of oblique photographs for the county were held by NLAP including some CUCAP photography. Both these sources had been used by the county to carry out their transcription exercise.

Other photographs for the Derbyshire part of the project area were known to exist in the private collections of R. Hartley and J. Pickering. NLAP held copies of almost all of the relevant Hartley photography but the Pickering collection remains an unknown quantity. All sites transcribed by the county were assessed by the project team from the available photography.

Leicestershire - Overall there was relatively little specialist oblique cover for the Leicestershire part of the project area. NLAP was thought to include copies of most of the photographs taken by the major flyer in the area, R. Hartley. Ultimately 28 SMR sites, originating from aerial photographs, could not be assessed by the project team from the available photography.

3.1.3.2 Non-archaeological air survey

A total of 5067 vertical air photographs from the NLAP were examined. Only photography at a scale of 1: 15,000 or greater was requested. The majority of the verticals (3188 frames) were taken by the RAF in the late 1940s and early 1950s at a nominal scale of 1: 10,500 and were distributed fairly evenly over the project area. Most of the remainder was by Meridian Airmaps Limited (MAL) covering most years from 1966 to 1982 (1173 frames, various scales). Of the MAL frames 50% were of the eastern third of the Forest and were mainly large scale photography of urban development on the west side of Leicester. Ordnance Survey verticals were limited (621 frames from 1970, '71)) and concentrated in the western end of the project area. Hunting Surveys Limited photography was also represented (85 frames, 1970).

Each of the three counties presumably holds a variety of vertical cover in colour and black and white, but none of which was quantified or accessed by this project. In respect of the vertical cover for Derbyshire the quantification exercise referred to in 3.1.3.1, mentions county wide 1:12,000 vertical cover held by Derbyshire County Council; this was not used in the 1990 transcription project. Neither Staffordshire or Derbyshire used the NLAP vertical collection in their transcriptions.

3.1.4 Other

Reports on various excavations and field observations, books, journals and other documents were accessed via the NAR library in Southampton.

3.2 PHYSICAL LANDSCAPE

3.2.1 Geology

Glacial boulder clays are the predominant drift geology of the entire Forest area with the exception of the river valleys. To the south and east of Ashby de la Zouch patches of glacial sands and gravels overlie the boulder clay. In the major river valleys alluvium predominates except in the Trent where there are extensive river terrace deposits, with some isolated deposits of fluvioglacial gravels.

At the heart of the Forest lies the south Derbyshire Coalfield, shale beds with many coal seams, centred on Swadlincote and Ashby de la Zouch. Immediately to the south east lies the Leicestershire coalfield largely lying under the Mercian Mudstones which cover most of the south-central and eastern parts of the Forest. The western part of the Forest also lies on Mercian Mudstones and it is within the Mudstol1es of this area that the high quality Tutbury Gypsum is found. East of Coalville the faulting of the Charnwood Anticline is marked by a number of large quarries working hard intrusions of Diorite and Granodiorite.

3.2.2 Geomorphology

In the east of the project area the relief is variable but never dramatic, with a maximum height of 248 m OD at Beacon Hill. Surface drainage is in the form of small rivers and streams with no particular directional trend, flowing in small but well defined valleys, sometimes with quite steep slopes. To the north of Ashby de la Zouch and west to Burton and the Trent valley the landscape is similar to that above but the drainage in this area tends to flow Northwards towards the east - west running section of the Trent. South of Ashby de la Zouch the relief is gentler still with a more rolling appearance. The surface water drains into the westward flowing river Mease which here forms the southern boundary of the Forest until its confluence with the rivers Tame and Trent near Alrewas. The broad valley/flood plain of the river Trent runs SW - NE cutting off the western most end of the Forest from the main body. To the north of Burton the Trent is joined from the west by the river Dove, at which point the enlarged Trent then turns to flow east. The Trent flood plain often exceeds 3 km in width and is never less than 1 km wide within the project area. The flood plain is particularly extensive on the south between Kings Bromley and the area around Alrewas where the three rivers, Trent, Tame and Mease come together. To the west of the Trent valley the land rises rapidly from the flood plain and climbs gently to attain 150 m in the north, and terminates in an east - west running scarp which looks out over the flood plain of the river Dove. The drainage of this block tends to flow south with much of it being collected by the river Swarbourn which joins the Trent near Alrewas

3.2.3 Soils

While there are a number of localised subtleties, most of the soils in the project area are slowly permeable loams and clays which can be subject to seasonal waterlogging. In the major river valleys and flood plains the soils are stoneless days and permeable loams for which the underlying river terrace deposits (Trent valley) keep the flood risk low and help produce excellent conditions for crop mark development (see fig. 2).

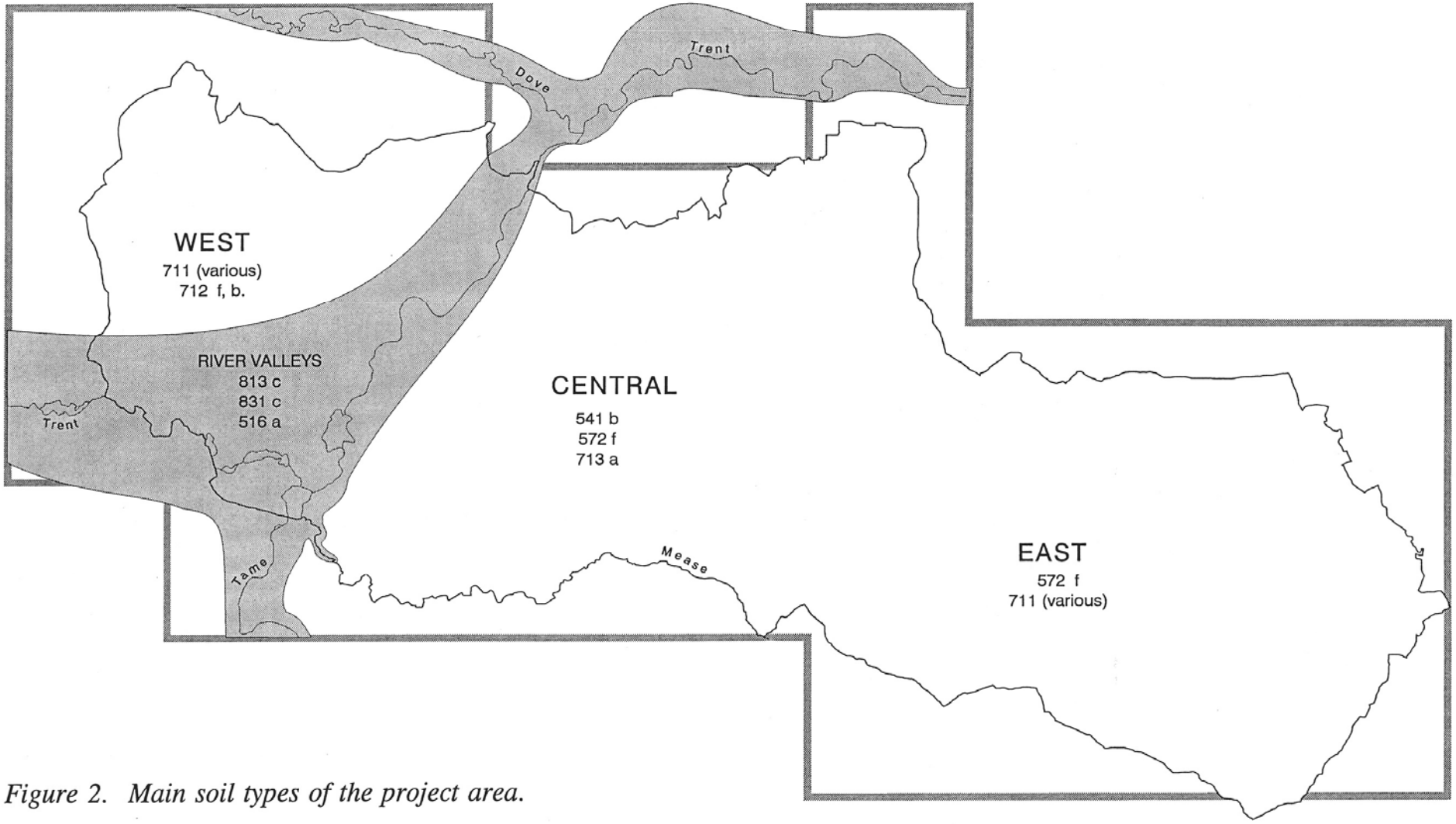

Figure 2. Main soil types of the project area.

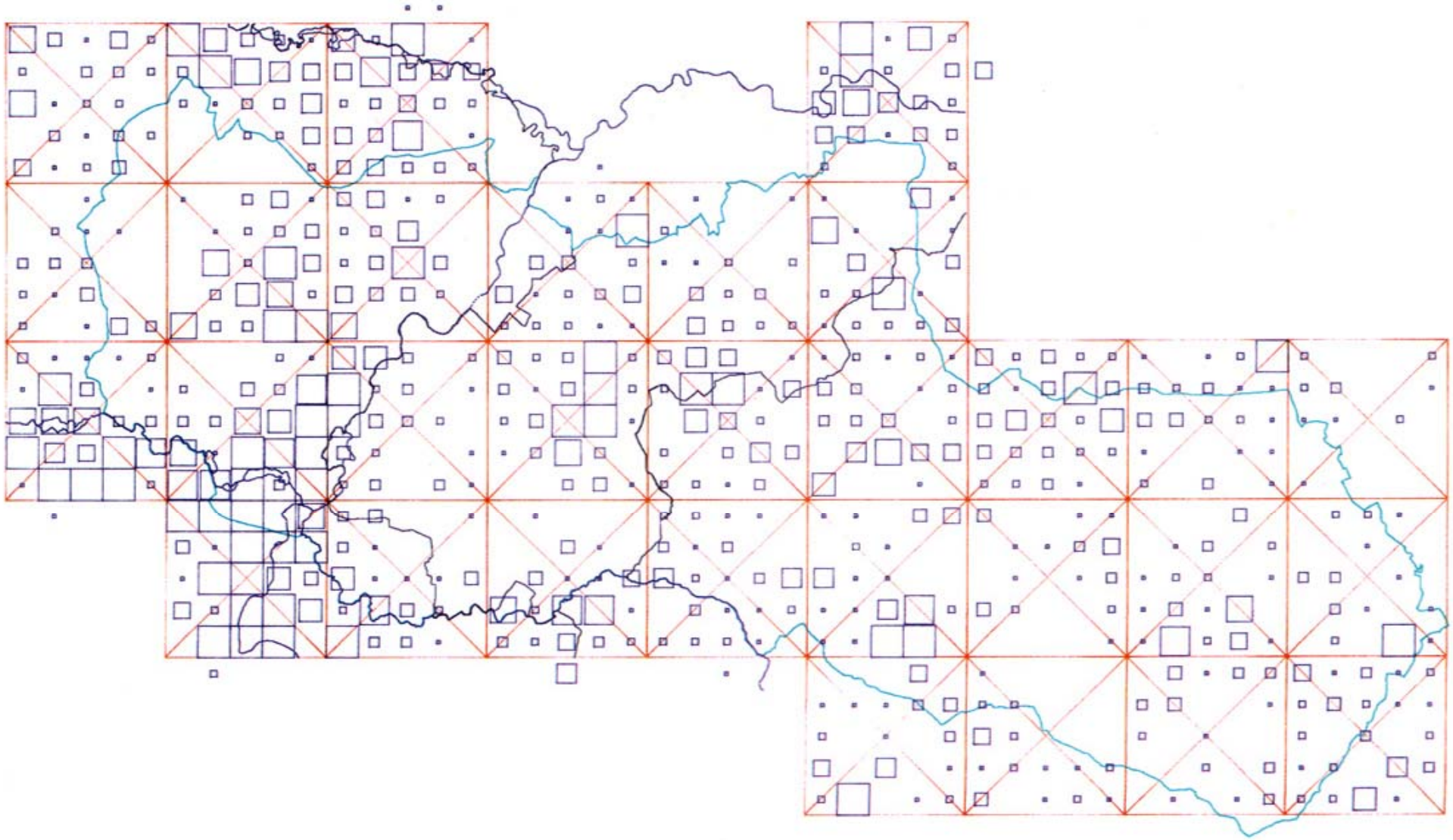

Figure 3. Distribution of all sites in the project area by km². Large squares = ten or more sites.

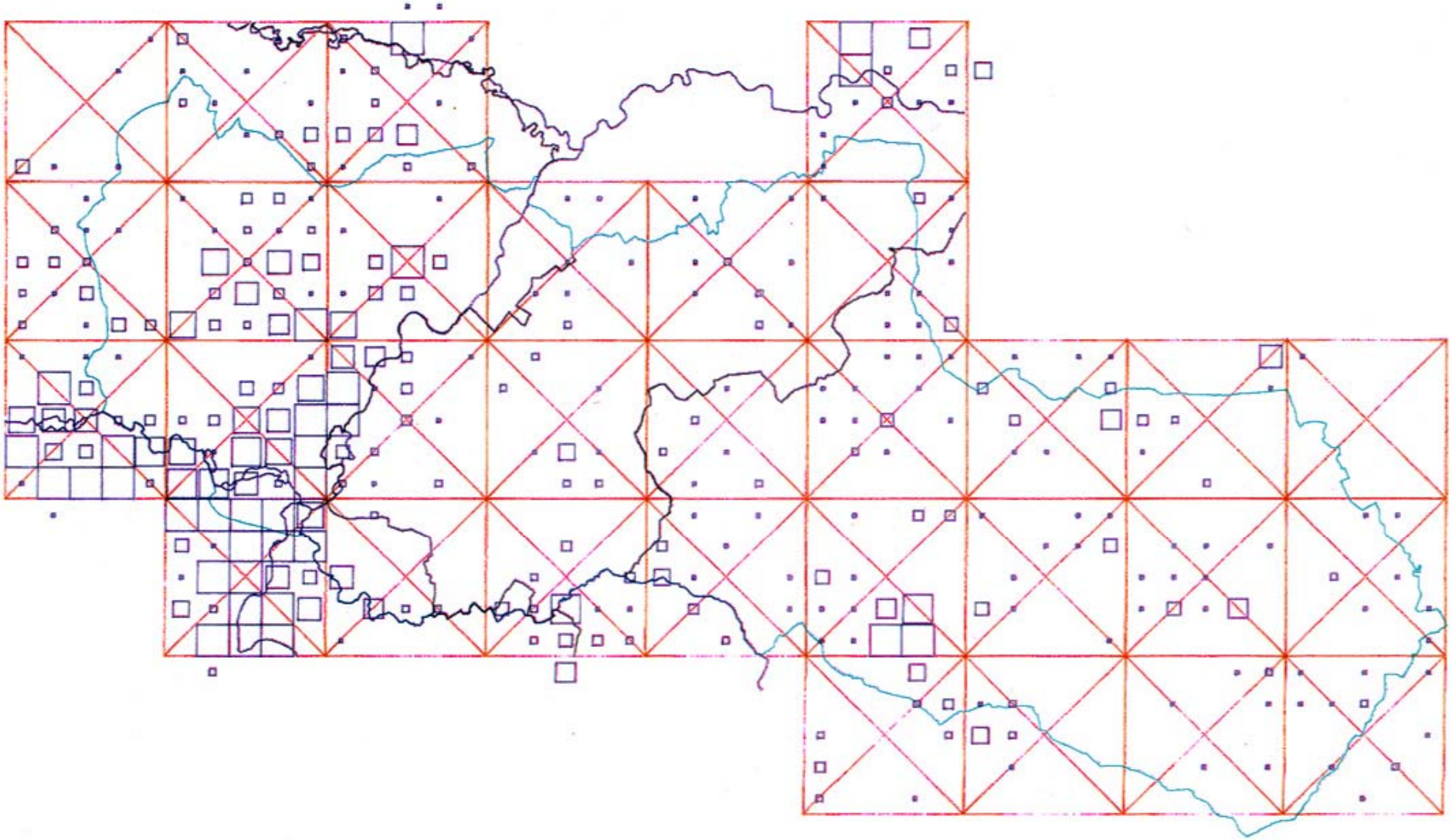

Figure 4. Distribution of crop marks by km². Large squares = ten or more sites.

3.2.4 Land use

Agricultural land use through out the area is dominated by permanent grassland which is used for dairying and stock rearing. Winter cereals are grown across the area but it is only in the major river valleys that the emphasis is on cereal production. In the central area around Ashby de la Zouch some mixed arable cultivation produces sugar beet, potatoes and some vegetable crops.

Circa 90 km2 of the project area is taken up by urban/rural development (see enclosed overlay).

Forestry and woodland covers less than 20 km2 spread across the entire project area but is most notable as a landscape feature in Needwood Forest to the west.

3.3 THE DISTRIBUTION OF ARCHAEOLOGICAL EARTHWORKS AND CROP MARKS

Figure 3 shows the distribution of all sites, by density per kilometre square. Note that the category "crop mark" also includes soil marks. There were 1292 sites recorded as crop marks (1342 if combination FORMS are counted; i.e. crop marks with earthworks and/or stoneworks). The distribution of crop marks (fig. 4) broadly reflected the distribution of specialist photography. There was a close correlation with soil type and a direct relationship with drift geology with crop marks concentrated on the river terrace deposits and on the fluvio-glacial gravels of the large river valleys. A handful of small concentrations occurred on the glacial sand and gravel deposits in the eastern part of the Forest, around Coalville and Ibstock. There was a random and generally light scatter of crop marks throughout the rest of the project area. Many of the sites outside the main concentrations are in fact soil marks recovered from verticals and were on clay soils not conducive to the development of crop marks.

Only 20 crop-mark sites were noted as having been destroyed (of a total of 52 destroyed sites for the entire database) but this is not likely to be an accurate figure, it simply reflects the lack of current sources (the latest vertical photography available to the project was from 1982 - many more sites are likely to have been destroyed by sand and gravel extraction in the last decade) .

There were 981 sites recorded as earthworks (1031 if combination FORMS are counted). Earthwork recovery was primarily from the verticals (which produced fewer sites than expected) and it was partly the variable quality of this source that determined the distribution pattern (fig. 5). Figure 6 shows the distribution of earthworks (177 including combined FORMS)., excluding those described as ridge and furrow, agricultural boundaries and drainage. There was no obvious clustering in the earthwork distribution but a band was apparent across the centre of the project area. This coincided with the main coal mining areas around Swadlincote, Ashby de la Zouch and east to Coalville. Along the south side of the Dove valley in the north west comer of the project area is a smaller band of earthwork sites, many of which were associated with the Gypsum mining around Fauid. An area notably devoid of earthworks was the ancient Needwood Forest. There was also a large blank area around Ibstock (SK 31 SE, SK 41 SW) in which even ridge and furrow was scarce.

3.4 LIMITATIONS OF RECORD

The NMP is a rapid survey exercise in which full evaluation of all the available archaeological and photographic sources is not practical. It is the intention of the NMP to present a clear, and as far as possible accurate, overview of the Prehistoric and historic landscape without attempting to depict every detail.

The products of this project are therefore not a complete record of the archaeology of the National Forest, they are an interpretation of the redundant man-made features of that landscape as seen on the aerial photographic resource. The information is biased by the factors described above (3.1 to 3.3), most notably by the limited areas with good crop mark potential and the lack of specialist cover for earthwork sites. The large proportion of built-up areas along with continuing industrial activity has also done much to mask or destroy earlier remains.

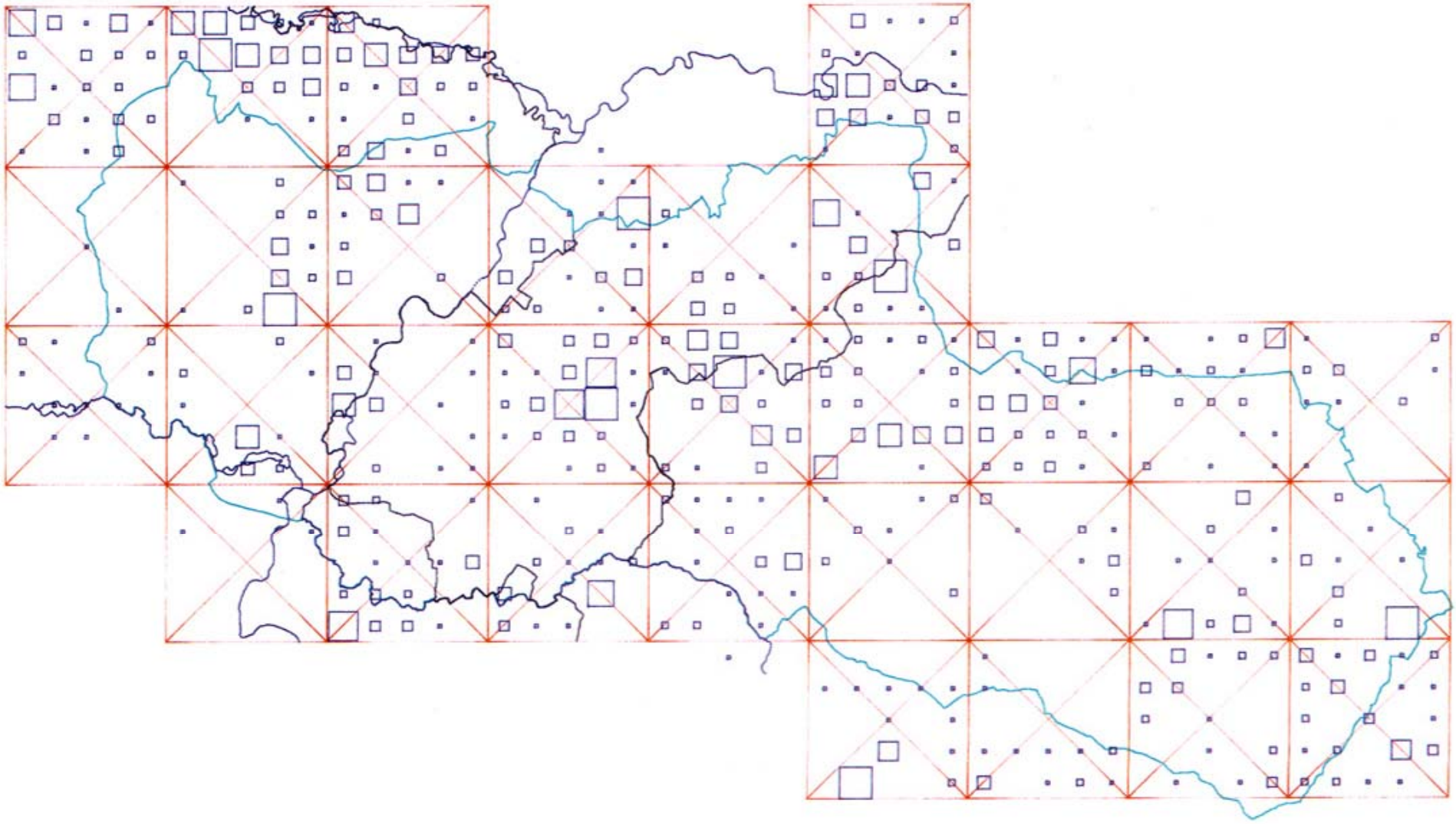

Figure 5. Distribution of earthworks by km². Large squares = ten or more sites.

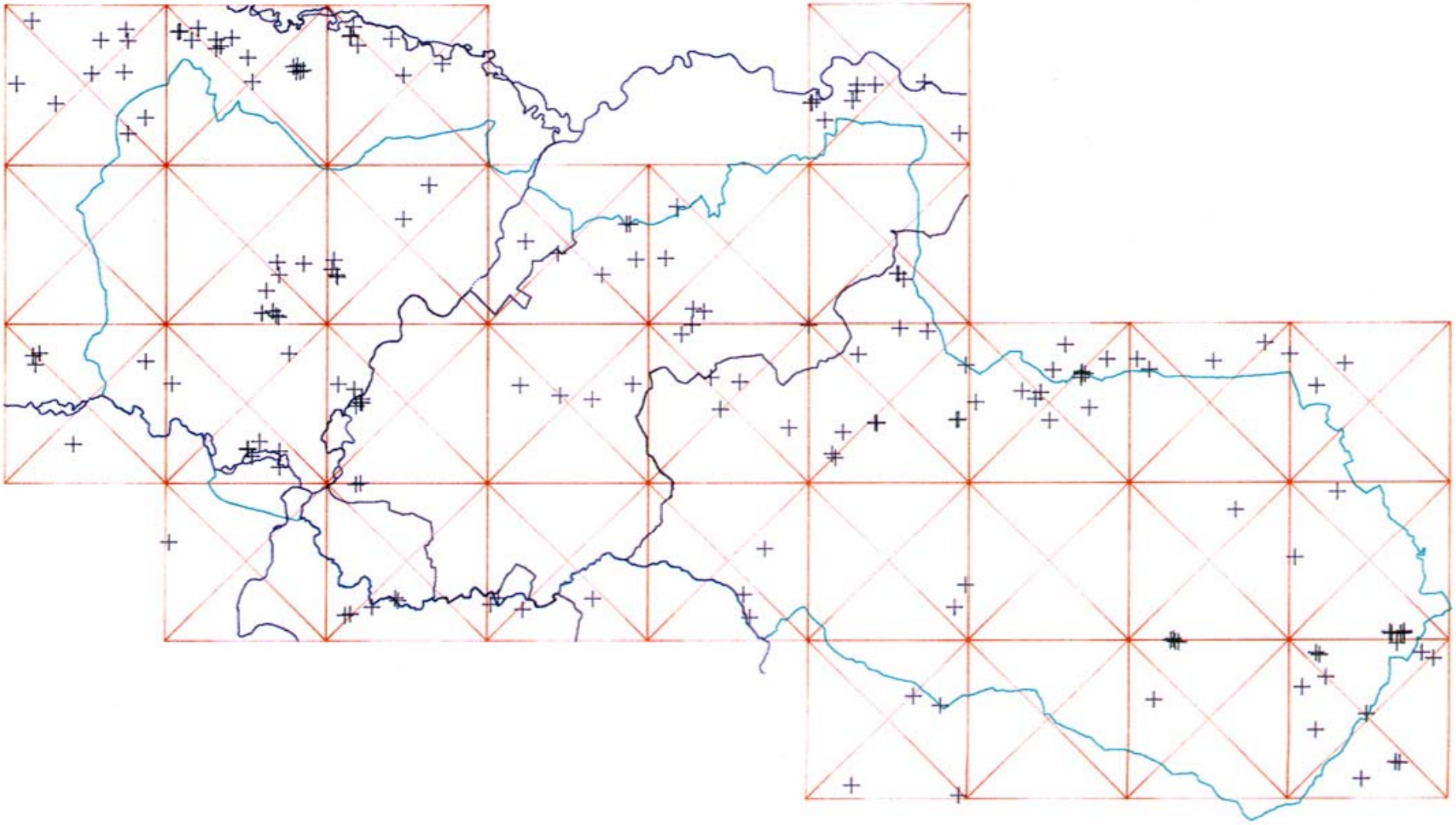

Figure 6. Distribution of earthworks with ridge and furrow, drainage and agricultural boundary features removed.

4 RESULTS

The results presented here are based on the completed National Forest project MORPH2 database (2385 records, dated 17101194), Map Note sheets and overlays only, unless explicitly stated otherwise. Users of this report are recommended to read the MORPH2 manual in order that they fully understand the nature of the record. It is worth noting that all MORPH2 records have a statement of "validity" attached, which expresses the confidence the aerial photograph interpreter had in their interpretation (type and period) of the site. In general this validity has been ignored in the following statistics but is worth bearing in mind if further work is intended on any of the classes described below. It should also be noted that the MORPH2 database only allows for one interpretation for each SITE (although a single additional interpretation is allowed for each GROUP).

Staffordshire	1230	SITES
Derbyshire	446	SITES
Leicestershire	709	SITES

4.1 THEMATIC REPORT

In the following chapters and in the Morphological Report, sites will normally only be referenced by their MORPH2 number, only occasionally will this be augmented by a place name or, more rarely, a National Grid Reference. This procedure has been adopted to make the text more readable and should NGRs or other locational or administrative information be required they can be accessed from the database via the MORPH2 number. The chapter headings and Site Interpretations are taken from the list of classes in the RCHME/English Heritage Thesaurus of Archaeological Site Types. (The asterices indicate a candidate term for the Thesaurus).

4.1.1 Agriculture :and Subsistence

SITE INTERPRETATIONS

CORNMILL	1	record
CROFT	3	records
CULTIVATION MARKS	2	records
CULTIVATION TERRACE	2	records
FARMHOUSE	1	record
FARMSTEAD	4	records
FIELD	5	records
FIELD BOUNDARY	423	records
FIELD SYSTEM	34	records
FISHPOND	25	records
LYNCHET	2	records
OSIER BED*	2	records
PARK PALE	7	records
PILLOW MOUND	3	records
PLANTATION*	4	records
PLOUGH HEADLAND	18	records
RIDGE AND FURROW	352	records
STACKSTAND	1	record
STOCK ENCLOSURE	1	record

VILLA	2	records
WATERMEADOW	2	records
WOODLAND BOUNDARY*	3	records
Total	**908**	**records**

GROUP INTERPRETATIONS

FARMSTEAD	3	records
FIELD SYSTEM	91	records
MANOR	1	record
MILL	2	records
RABBIT WARREN	1	record
Total	**98**	**records**

Field boundaries account for almost half the sites in this class and are mainly Post-Medieval features identified on the historic map base and recovered from the vertical photographs. Most of the field boundaries (379) were recorded singly or in small groups (i.e. without a Group table entry). Less than 8% (33) formed parts of GROUPS interpreted as field systems. Fourteen of the boundaries, all crop or soil marks, were dated Roman or earlier, most of them in the Trent/Tame flood plain around Alrewas.

Five Prehistoric field systems were identified, all bar one assigned to the Iron Age and three of which are defined by pits (N .B. had the individual elements occurred in isolation they would have been interpreted as pit alignments). Two of these pit-defined field systems had an ordered rectangular layout; FR.40.1.1 in particular displayed a very regular size of field unit (circa 300 m x 100 m) with a main axis perpendicular to the river Trent and including a pit-defined trackway. Elements of this same site appeared to form part of another phase of land division (less orderly and on a different alignment) in combination with continuously ditched elements (FR.40.10.1). (See top right on fig. 28).

A group of individual pit alignments (FR. 9.20.1-7) suggested a field system with much larger field sizes than the field systems noted above. This group displayed a main axis almost perpendicular to the river and a cross axis at approximately 40 degrees to the main axis. Most of the remaining 39 pit alignments (35 of which were thought to be Iron Age and 4 Unknown Prehistoric) listed under Unassigned (4. 1.10) could probably be considered as field boundaries. The dating of these pit alignments and pit-defined field systems was uncertain, comparable excavated examples in other areas have produced Iron Age or earlier dates (based on MONARCH data).

There were a number of incidences where a funnel-like relationship occurred, either between two pit alignments or between a pit alignment and a ditched feature. Most of these features formed part of the pit-defined field systems discussed above and were possibly related to stock management. At SK 1364 1677 a pit alignment appeared to deflect from a straight course to parallel a converging ditched boundary with which it then formed an enclosed trackway (fig.7a). At SK 1205 1557, pit alignments, which appeared to be elements of a fragmentary field system, formed a rather wide mouthed funnel. Half a kilometre to the east, at SK 1245 1544, a pit alignment and a ditch converged to form a very narrow, curving trackway (fig. 7b). The clearest example was at SK 3054 1294 where two pit alignments, apparently not part of a wider field system like the other examples, converged forming a long funnel

Figure 7. Pit alignment funnels. Scale 1:10,000

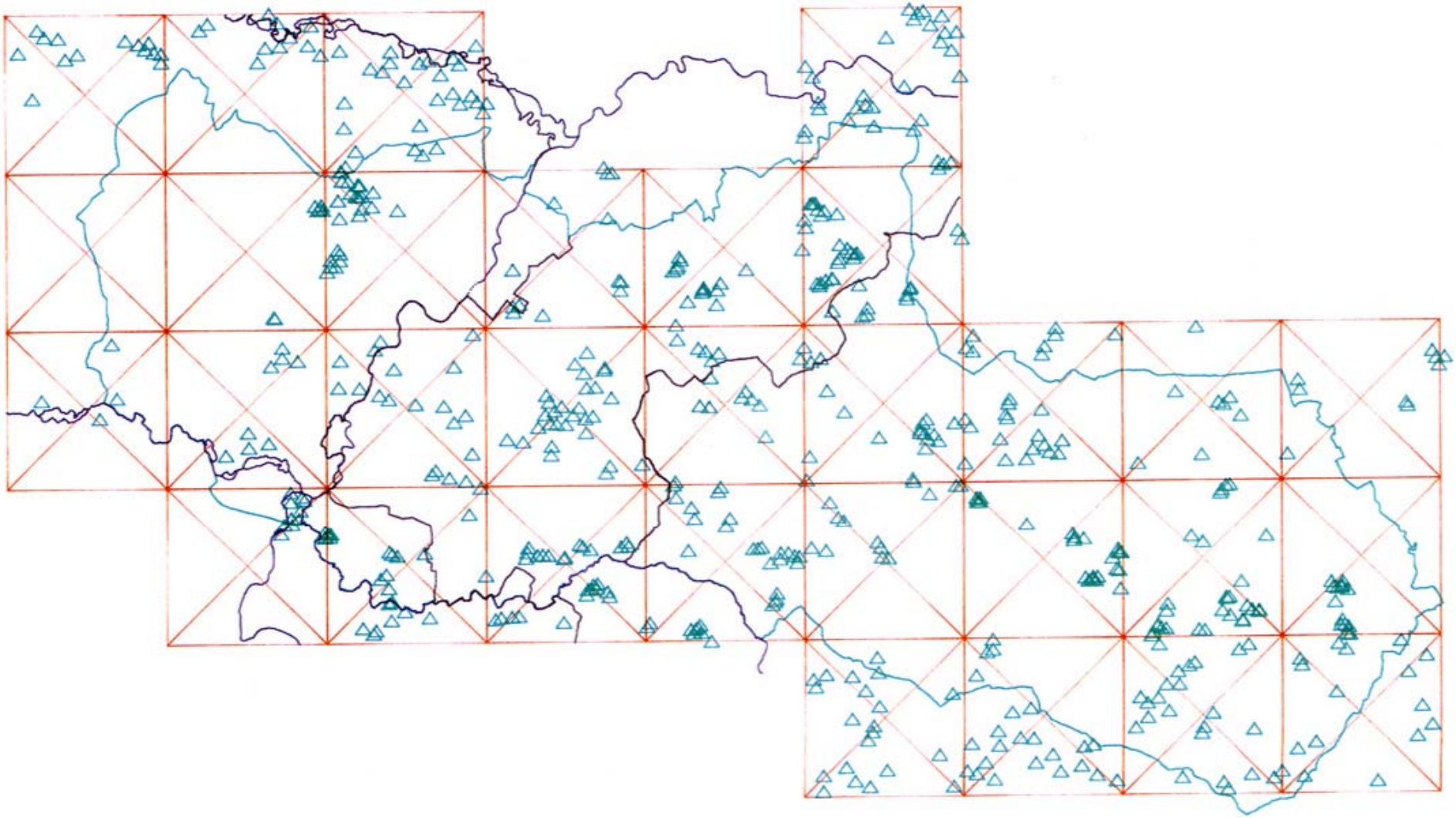

Figure 8. Distribution of ridge and furrow.

narrowing to a short length of pit defined trackway (fig. 7c). The last example was at SK 1944 1682 where the two pit alignments weree again part of a large but fragmentary system. In this case the pit alignments did seem to close with each other: however, 50 m or so beyond the point where they meet, a pit defined trackway continued the line of the main pit alignment (fig. 7d). These "funnels" were identified by a visual scan of the transcriptions and could not be recovered by interrogation of the database.

Two pit-defined enclosures were also identified (FRA1.18.1 & 19.1). These enclosures were irregularly shaped and elongated, and one lay close to but had no apparent physical relationship with, the pit-defined field system FR.41.17.1; however the similarity in form (i.e. construction) may indicate contemporaneity. Both enclosures appeared to be open ended but there was insufficient evidence to interpret the gaps as entrances (both enclosures can be seen on fig. 7b, at top left and top centre).

Ridge and furrow survival appears to be poor and fragmentary in the area. Of the total 352 sites interpreted as ridge & furrow only 44 % are in groups interpreted as field systems. The relationship between ridge & furrow and the Royal forests and parks may be significant in respect to ridge & furrow survival. For example the distribution plot of ridge & furrow highlights its apparent absence in Needwood Forest (fig. 8). It is also noticeable that there are virtually no records of settlement to accompany the ridge and furrow (see also 4.1.3). It should be remembered that virtually all of the ridge & furrow was drawn from verticals and may subsequently have been destroyed during the last 25 years.

Evidence for rabbit farming was found at three sites in the project area. A possible artificial rabbit warren (FR.61.1), with a pillow mound circa 30m long was contained within a walled, rectangular enclosure; at one end of the pillow mound a possible structure may represent the rabbit "type", a selective harvesting trap (Harris, A. 1991). Record FR.211.1.1 represents 17 small pillow mounds scattered across the end of a prominent ridge with the name Warren Hills. One other possible pillow mound was recorded as FR. 74.6.1. 15

Fishponds were present in reasonable numbers, generally in an identifiable parkland context. There were 25 fishponds assigned in the following way: Medieval (12), Post-Medieval (11) and Unknown Medieval (2) periods. Two of the "fishpond" records are multiple MACULA records representing a total of seven fishponds increasing the overall total to 30. The majority of the ponds (23) occurred in GROUPS of two or more, with or without other types of site. The number of fishponds recorded for the project area would be considerably higher if targeted by ground survey, as many are masked by tree cover.

4.1.2 Defence

SITE INTERPRETATIONS

AIRRAID SHELTER	7	records
AIRCRAFT OBSTRUCTION*	9	records
AIRFIELD	2	records
BEACON	1	record

BOMB CRATER	2	records
FIELDWORK	5	records
FORT	1	record
CASTLE	1	record
GUN EMPLACEMENT	3	records
HILLFORT	1	record
MAGAZINE	6	records
MILITARY BASE	1	record
MOTTE	4	records
PILLBOX	3	records
RAMPART	6	records
RIFLE BUTTS	2	records
SEARCHLIGHT BATTERY	3	records
SLIT TRENCH	3	records
Total	**55**	**records**

GROUP INTERPRETATIONS

AIRCRAFT OBSTRUCTION*	1	record
ARMAMENT DEPOT	1	record
CASTLE	2	records
DYKE	1	record
FIRING RANGE	1	record
FIELDWORK	1	record
HILLFORT	1	record
MILITARY BASE	3	records
MOTTE AND BAILEY	4	records
PROMONTORY FORT	1	record
SEARCHLIGHT BATTERY	1	record
Total	**17**	**records**

There were four possible Prehistoric fort sites in the project area. The fort on Marchington cliff (FR.66.1) is located on a promontory overlooking the Dove valley.. The area of the promontory contained by the defences is approximately 300 m x 200 m while a smaller enclosure 72 m x 44 m is attached to the inner side of the main rampart. The vertical photography of Marchington suggests the presence of finer detail which will be picked up when the fort is ground surveyed as part of the RCHME Keele Office Staffordshire Hillforts project.

A GROUP of LINEAR FEATURES (FR. 77 .1.1-4) all with the interpretation "rampart" (GROUP INTERPRETATION "HILLFORT"), are all that could be discerned on the photography of the presumed Iron Age fort at Borough Hill. This roughly rectangular fort has been ground surveyed and is approximately 200 m x 150 m. As at Marchington this fort is sited on a promontory, over looking in this case, the river Trent.

Bury Camp (FR.203.2.1) is a fairly regular "playing card" shaped enclosure also ground surveyed, and measuring 230 m x 130 m. Unlike the previous two forts Bury camp makes no attempt to utilize the topography in its plan nor is it in a particularly prominent location, being sighted on a slope rather than the local high point. Were it not for the absence of convincing entrances (despite several gaps in the bank) this enclosure would look very like a 1st12nd century Roman auxiliary fort and is in fact

scheduled as a Roman site. 600 m to the northwest the site is overlooked by the more strategically attractive hill of Ratby Borroughs. This hill and not the chosen site would have been a more usual location for a pre-Roman fort and earthworks were noted here in the 1920s, however nothing was found by a field officer in 1972 or on the vertical photography by this project (see NMR SK 40 NE 3). In accordance with the latest update (NMR SK 40 NE 4) Bury camp was given "Iron Age" as its period.

Beacon Hill hillfort (FR.229.1.1) was assigned to the Bronze Age in accordance with the existing NAR record, though this gives "settlement" as the interpretation. This project has opted for the interpretation "hillfort" because of the site's location and appearance on the photography. There was no sign of any internal detail on the available photography but most of the hill is covered in bracken which even when dead, can mask substantial earthwork features.

The four Motte and Bailey GROUPS include Tutbury castle (FR.99.16) and a site at Groby (FR.239.1), recorded on RAF and CUCAP photography but now almost totally destroyed by road construction. A further site at Castle Gresley (FR.112. 20.1), though previously surveyed may benefit from detailed field inspection.

The remains of a large double ditched endosure (FR.232.1.1) of approximately 150 m x 100 m were recorded adjacent to the site of Burleigh Hall, Loughborough. This enclosure may be a large moat or could be part of the fortifications of the earlier house, carried out during the English civil war (NMR SK 51 NW 2

Military features from World War 2 accounted for 33 of the 63 Modern records. 9 of these formed a group of anti-aircraft obstructions near Melbourne at Stanton-by-Bridge in a loop of the river Trent (SK32NE) (fig. 9). In the 1940s the War Department recommended various forms of obstruction to farmers of large fields to prevent the landing of troop carrying enemy aircraft. The obstructions here were of two forms; linear perpendicular arrangements of long mounds (of sand?), alternately off-set left and right of each main axis and groups of randomly scattered mounds. Near by were several larger mounds of similar material suggesting either stockpiling for the creation of other obstructions or evidence of their clearance. The linear type has been recorded by other RCHME projects notably in Lincolnshire and the Royal Parks but in these areas the mounds were usually quite small and cast up alternately left and right of the borrow trench from which they were derived. In the Trent examples the mounds were very long (20-40m), occasionally overlapping and lacked borrow trenches suggesting that the material for their construction was imported from local sand and gravel quarries. Ephemeral features like these will now be untraceable though some of the Lincolnshire examples do survive, looking very like redundant field boundaries. Other wartime features included an extensive system of air raid shelters buillt for the safety of the work force at a large factory at Branston, south of Burton (SK22SW). A good illustrative example of a searchlight battery (FR.177.1) was noted south of Melbourne. On several maps the locations of dispersed military munitions dumps were identified but not consistently recorded unless they left tangible remains such as concrete hut bases. Of thl;! six records interpreted as magazines, all but one represent the remains of such munitions dumps (see GROUPS FR.199.5 and 222.9). The remaining magazine was part of a GROUP interpreted as a searchlight battery. It is probable that many other wartime

features survive in the project area but their identification would be more efficiently achieved by documentary search and field work.

The Firing Range is discussed below (4.1.7) as it was probably recreational.

4.1.3 Domestic

SITE INTERPRETATIONS

BAILEY	5	records
DESERTED VILLAGE	2	records
FARMHOUSE	1	record
GRUBENHAUS	1	record
HOUSE	1	record
HUT CIRCLE	19	records
MOAT	23	records
TOFT	4	records
VILLA	2	records
Total	**53**	**records**

GROUP INTERPRETATIONS

COUNTRY HOUSE	1	record
DESERTED VILLAGE	5	records
MOAT	1	record
SETTLEMENT	9	records
Total	**16**	**records**

The "grubenhaüs" interpretation belongs to a MACULA record describing 16 grubenhaüser at the Anglo-Saxon settlement at Catholme (see section 4.3.8 for further comment on this site).

Only five sites were recorded as deserted villages. This may be an indicator of the frequency with which villages of Medieval origin have continued in use to the present day. However, other explanations for the apparent absence of Medieval village earthworks should also be considered. One possibility is the poor overall quality of the vertical photographs, but this is unlikely to be the main reason for so few identifications. Land use must also be a factor in village earthwork survival, and as with ridge and furrow, there is probably a link with the extent of parklands which often systematically destroyed Medieval economic landscapes; Royal and private forests in particular, inhibited settlement and cultivation.

The 23 recorded moated sites have been assigned to various Periods from Early Medieval through to Post-Medieval, including 6 "Unknown" Medieval. Most might better be considered as falling within one period band spanning the Medieval - Post-Medieval Periods (N.B. cross-period bands can not be entered in MORPH). The single moat dated Early Medieval was unusual in being round, and was assigned an Early Medieval date in accordance with the existing NAR record. The distribution of moated sites shows two distinct groups, one in the east and the other in the west; the central area from Coalville to Burton-upon-Trent has only one recorded moat. Although many other moats are known in the project area (38 recorded in MONARCH) most were not seen on the available photographs for various reasons, primarily the density of tree cover.

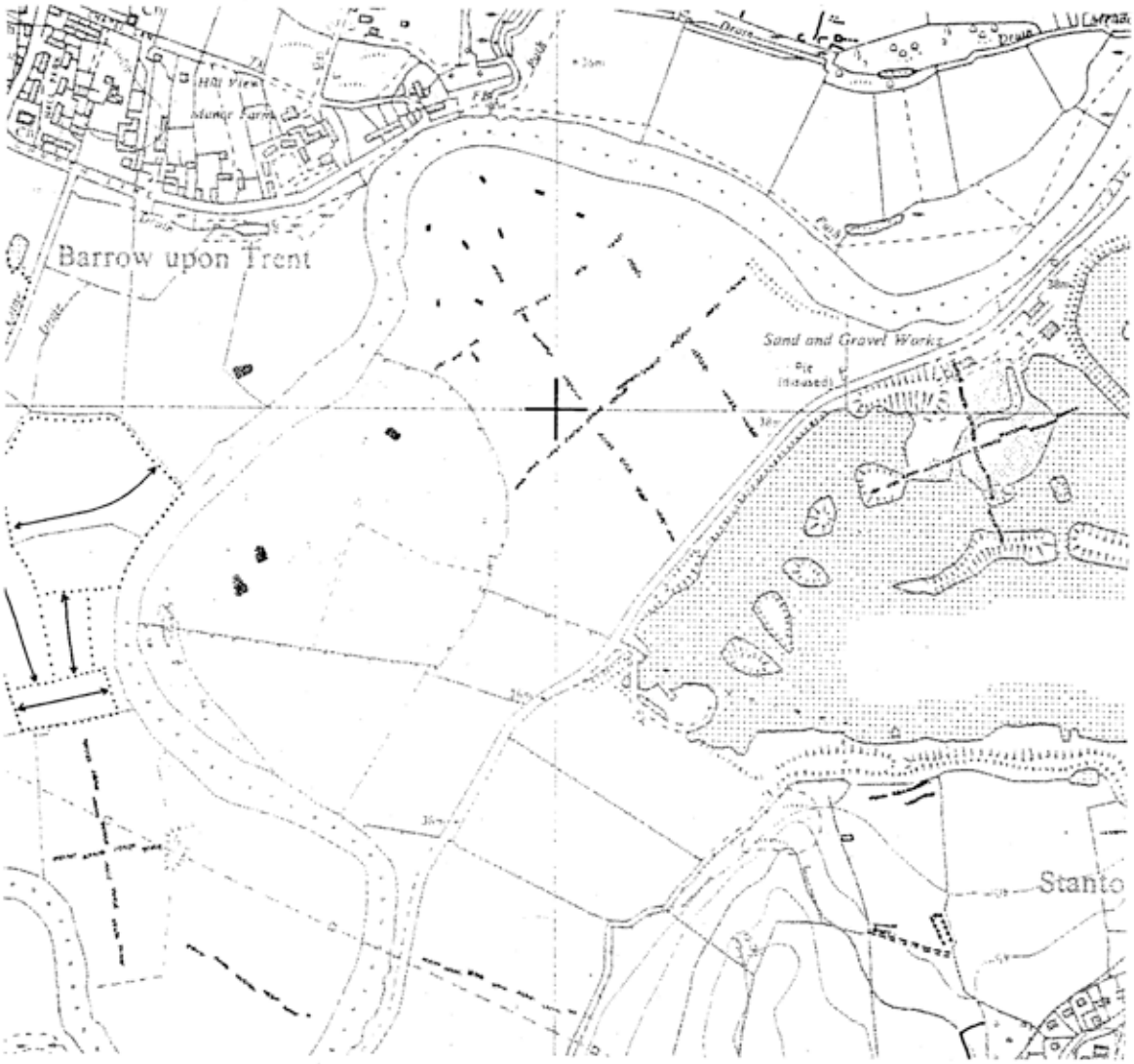

Figure 9. Aircraft obstructions. Scale 1:10,000

Of the numerous country houses in the project area only Gopsall House (FR.173.3.1) was given a record. Although the house was still partly in use at least until 1948 it was demolished soon after this date. It was decided to record the house and the layout of its long-neglected formal gardens since only the 1st edition OS maps appeared to give a complete picture of the original layout.

4.1.4 Gardens and parks

SITE INTERPRETATIONS

GARDEN	6	records
ORNAMENTAL POND	2	records
ORNAMENTAL TERRACE	3	records
PARK PALE	7	records
TREE AVENUE	4	records
TREE ENCLOSURE RING	2	records
Total	**18**	**records**

GROUP INTERPRETATIONS

FORMAL GARDEN	1	record
LANDSCAPE PARK	1	record
Total	**2**	**records**

Only seven linear Feature records were given the interpretation park pale despite there being 81 parks recorded for the project area by the OS 1st edition map search. Three of these records were grouped together but the others represent isolated fragments. It is probable that many more park boundaries survive in the area but are still in use as field boundaries, others will be obscured by mature tree cover and only identifiable by ground survey.

In Garendon Park (SK500193, created in the 17th century ?) several crop marks were recorded (on SK 41 NE), some of which may be early landscaping features e.g. FR.222.3.1., which was a leat associated with the ornamental fish pond FR.222.3.2. Others belonged to the Medieval pre-park landscape and may relate to the Cistercian abbey that occupied the site of the now demolished Garendon house, from AD 1133 to 1536.

Five formal garden remains were recorded. The most impressive belonged to Gopsall hall (FR.173.2.1-5) which was itself recorded with the interpretation "house". Gopsall Park (and probably the house) was used as a vast military vehicle park in the mid 1940s and was recorded as such (FR.173. 3 . 1).

4.1.5 Industrial

SITE INTERPRETATIONS

BELL PIT	1	record
BRICK PIT	1	record
CLAY PIT	4	records
COAL MINING*	2	records
COAL WORKINGS	3	records
EXTRACTIVE PIT	8	records
GRAVEL PIT	7	records

GYPSUM QUARRY	14	records
HORSE WHIM	1	record
KILN	4	records
LIMESTONE QUARRY	9	records
MILL POND	12	records
MILLRACE	6	records
MINE	1	record
POST MILL	1	record
QUARRY	37	records
SALTWORKS	1	record
SAND PIT	2	records
SANDSTONE QUARRY	8	records
SHAFT	38	records
SPOILHEAP	5	records
TAIL RACE	1	record
WINDMILL	1	record
WINDMILL MOUND	5	records
SUBSIDENCE*	5	records
Total	**176**	**records**

GROUP INTERPRETATIONS

BRICKWORKS	9	records
COAL MINE	7	records
COAL MINING*	3	records
COAL WORKINGS	1	record
CLAY MINE*	7	records
FLOUR MILL	1	record
GYPSUM WORKINGS*	2	records
LIME WORKS	2	records
MINE	2	records
POTTERY WORKS	2	records
QUARRY	3	records
STONE WORKING SITE	1	record
Total	**40**	**records**

Industrial sites featured prominently in the forward planning for the project and their recovery for the record became the primary aim of the OS 1 st edition map search. As a result of this exercise many industrial sites were given record numbers and effectively monumentalized as they appeared on the 19th century map base. It was expected that the aerial photographic transcription exercise would likewise recover a considerable number of industrial sites from the vertical photographs. However, virtually all the industrial sites identified on the photographs were still in use post 1945 (i.e. after RCHME Archaeology Division "sphere of interest" cut off date) and therefore were not recorded on the aerial photograph transcriptions. Many of these sites had developed and expanded, obscuring or destroying the earlier features depicted on the OS 1st edition maps.

Extraction pits (mainly sand and gravel), which proliferate in the riverine areas, were not recorded unless they formed an integral part of a GROUP containing other recordable features (e.g. buildings, tramways). Solid geology quarries were included and resulted in a total of 68 records.

A total of 226 shafts (of various extractive industries, see fig. 10) are represented by 38 Macula descriptions. Additionally three areas were recorded as][ndustrial Complexes and will account for several hundred more shafts (see section 4.2.6). The majority of these shafts were related to coal mining but an unidentified number were probably clay mines; it was not possible to differentiate these on the aerial photographs.

Coal mining has played a major economic role in the development of the project area particularly around Swadlincote and Ashby de la Zouch. Much of the infra-structure of this area was created to meet the demands of the coal industry, but many of the early railways and canals have long been abandoned (see 4.1.9).

In the Coleorton area, the MORPH2 GROUP FR.140.6, east of Ashby de la Zouch, incorporates several MACULA records with the interpretation "shaft" which may represent Medieval coal mining. Recent survey work in this area carried out by R. Hartley of Leicestershire Museums Services has identified areas of fifteenth/sixteenth century, and seventeenth! eighteenth century coal mining (Hartley, 1993). A brief assessment of the relevant project transcriptions by R. Hartley suggests that more than 50% of the area covered by GROUP FR.140.6 holds the remains of fifteenth/sixteenth century coal mmmg. In particular FR.140.6.3 covers the area in which dendrochronological dates of the mid fifteenth century have been obtained from in situ pit props. The actual number of coal mining shafts in this area was probably many times greater than the 150 identified by the project.

Of the 226 recorded shafts, eighteen (FR. 47.6. 1 & FR. 48. 15.7) were associated with the Draycott gypsum mine and quarries (FR.48.15) between Hanbury and Draycott-in-the-Clay (SKI2NE). The mining of Alabaster (Gypsum) in this area began as early as the 12th century (pers comm R. Hartley) so it is possible that a few of the shafts in GROUP FR.48.15 may relate to this period. The Draycott mine and quarries were served by a tramway (FR.48.15.4) part of which can still be seen on the ground. All the other recorded remains of the quarrying have been efficiently infilled or levelled and returned to pasture.

The Fauld mine, owned by British Gypsum, is still in production but the verticals showed an un-mapped and by the late 1940s, ruinous Hoffmann kiln on site (FR. 47. 18.1). During the war part of the mine was used by the RAF as a munitions store which in November 1944 blew up forming a huge crater with a wide area of destruction around it (fig. 11). Photographs taken soon after the event allowed the project to record the main crater and the full extent of the area affected by the secondary explosions (the largest ever on the British mainland). Some of the bomb craters caused by secondary explosions survive in the regenerated woodland above the mine (circa SK 183 279). Naturally the profusion of craters made the identification of early mining shafts impossible. To combat this it would be desirable to examine any pre- 1944 verticals that may become available for consultation at a later date.

Early Alabaster mining also took place at Chellaston near Swarkestone, in Derbyshire during the 12th to 13th centuries (pers comm R. Hartley). It is possible that the isolated area of shafts recorded as FR.158.2.1 is all that remains of this industry. In the case of the industrial remains it is particularly clear that whilst aerial

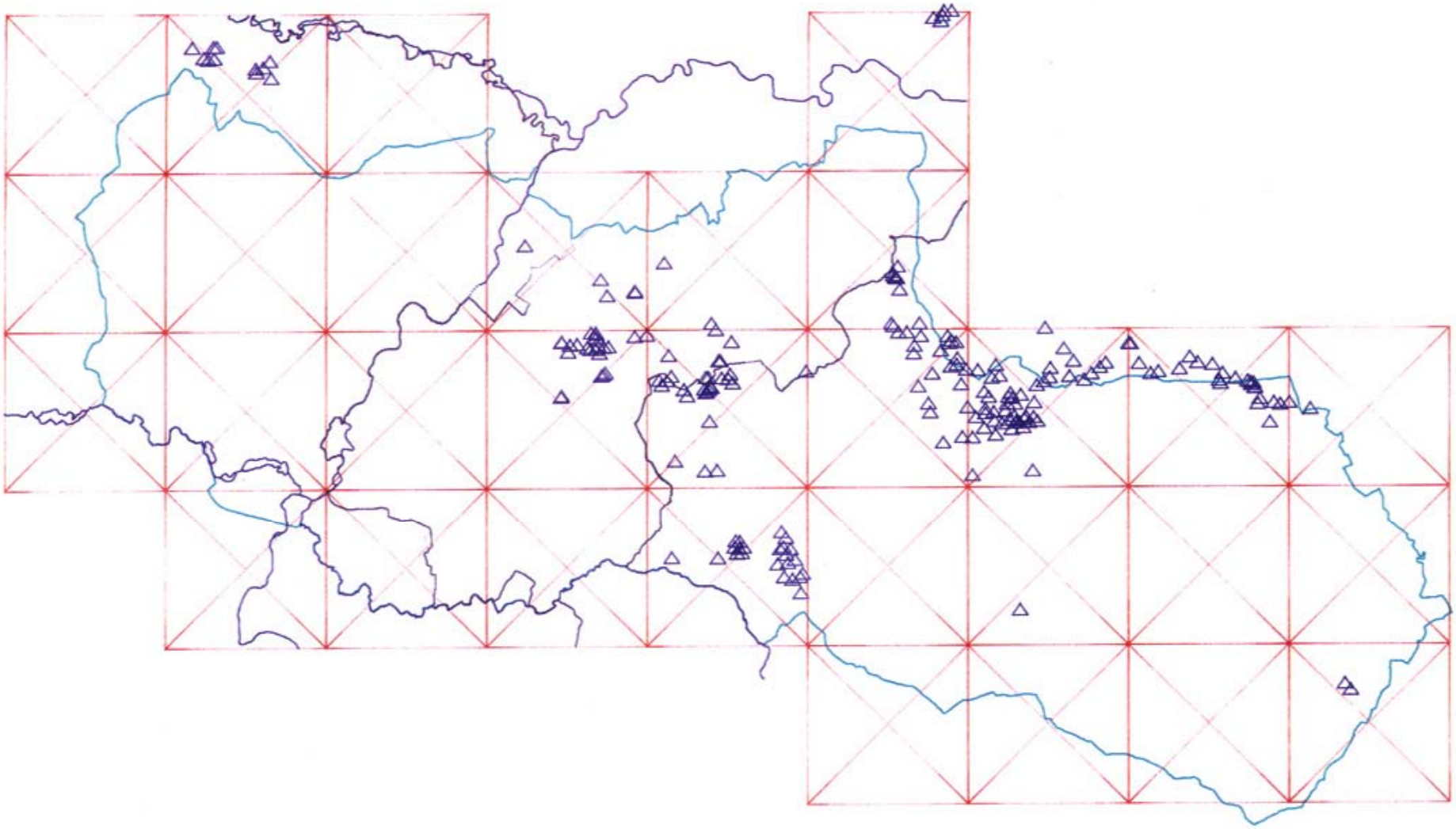

Figure 10. Distribution of all mining related features.

Figure 11. Fauld mine crater, Hanbury. The broken line indicates the area most seriously affected by the explosion. Scale 1:10,000

photographs are a useful primary source for recording the extent of industrial activities (some of which may since have disappeared) the understanding and full interpretation of the evidence can only be achieved by additional ground survey and historical research.

4.1.6 Maritime

There is no coastline within the project area therefore no records in this class.

4.1.7 Recreational

SITE INTERPRETATIONS

BOWLING GREEN	1	record
RIFLE BUTTS	2	records
PARK PALE	7	records
Total	**10**	**records**

GROUP INTERPRETATIONS

FIRING RANGE	1	record
Total	**1**	**record**

Very few sites were assigned to this monument class. The "park pale" sites have been discussed under 4.1.4.

The GROUP FR.136.4 was interpreted as a firing range. There were four mounds set in a line and at distances of 200, 250, 300 and 400 yards from the curved bank of the butt itself. A possible fifth mound was slightly offset from the main line and appeared to be at approximately 360 yards distant from the butt. This group of sites was seen on 1940s RAF verticals as earthworks surviving in pasture and were depicted on the OS 1st edition map, which dates its construction no later than the 1870s. There was no apparent military connection so the range may have been purely recreational. Recent aerial reconnaissance noted that this site no longer survives.

The bowling green (FR.136.1.2) was at Ashby de la Zouch castle and was in use as late as AD 1720 (HMSO, 1993). Ground inspection suggests that it may have been more appropriate to interpret this sunken rectangular area as a garden since that would appear to have been its last use.

4.1.8 Religious, ritual and funerary

SITE INTERPRETATIONS

BARROW	123	records
CAUSEWAYED RING DITCH	1	record
CHAPEL	2	records
CREMATION CEMETERY	1	record
HENGE	2	records
MORTUARY ENCLOSURE	1	record
PIT CIRCLE	2	records
TEMPLE	1	record
Total	**133**	**records**

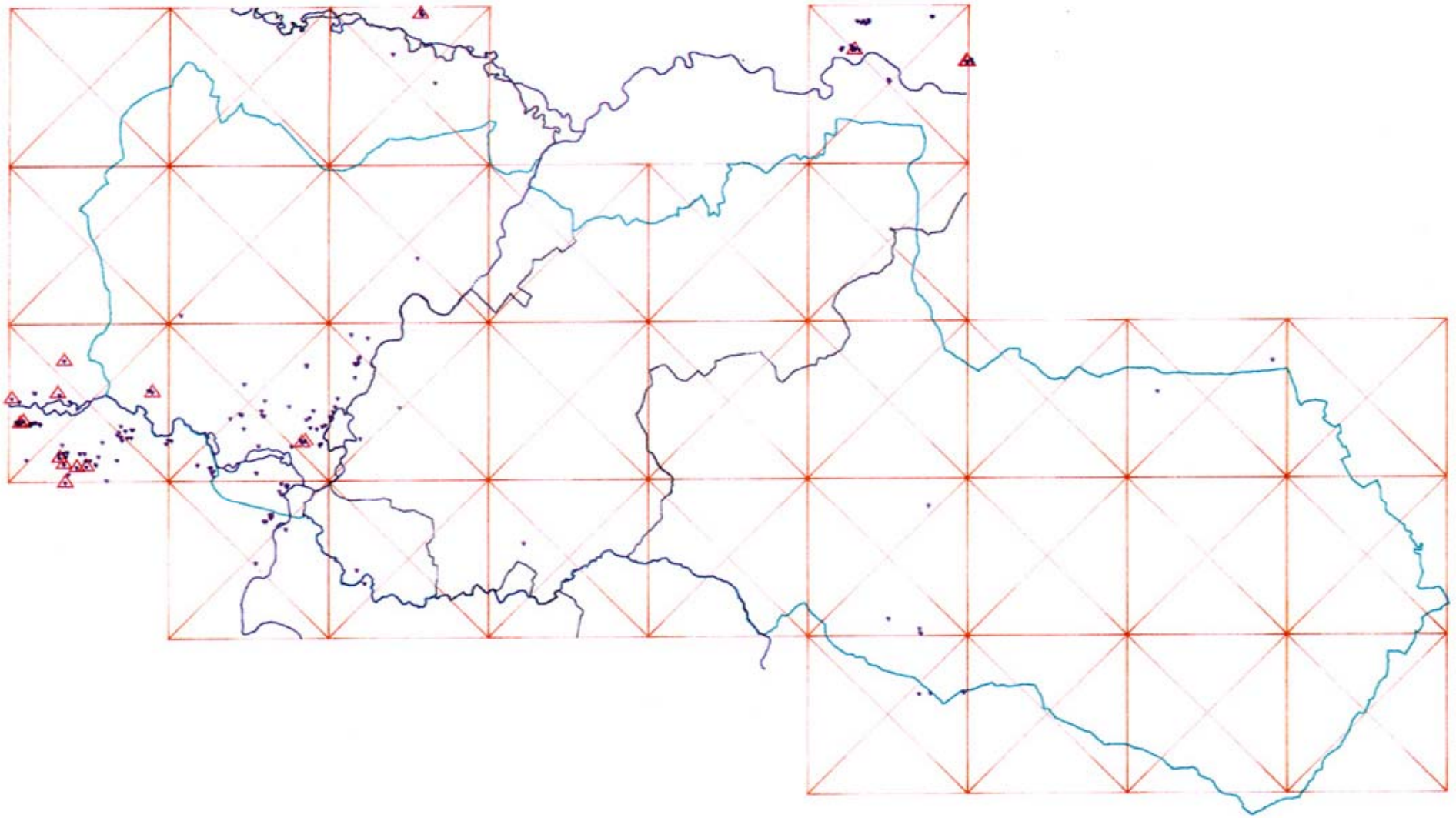

Figure 12. Distribution of barrows and possible barrows. Red triangles indicate polygonal enclosures.

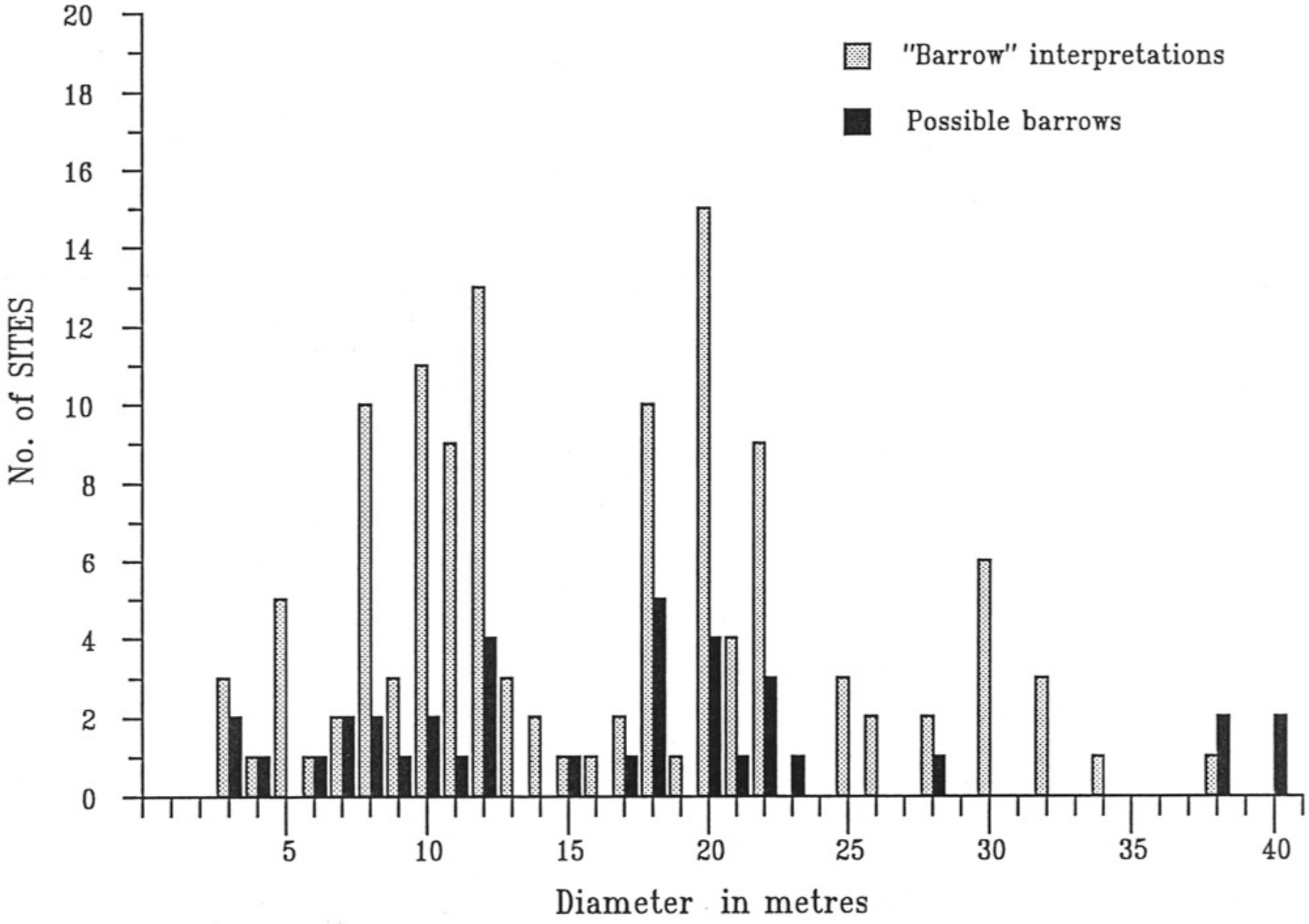

Figure 13. Relative diameters of sites with the interpretation barrow and of other sites which may be barrows.

GROUP INTERPRETATIONS

BARROW CEMETERY	10	records
PRIORY	2	records
Total	**12**	**records**

All the "barrows" were seen as crop- or soil-mark ring ditches with the exception of four of the six recorded at Swarkestone Lows (FR.165.1) which were seen as slight earthworks (see fig. 12).

Of the 123 barrows 51 were distributed among the 10 GROUPS identified as barrow cemeteries. The remaining 72 were either recorded in isolation or in numerically small groups which lacked sufficient coherence to warrant interpretation as barrow cemeteries. All 10 "cemeteries" were given the date Unknown Prehistoric (51 "barrows") as were 8 of the remaining 72 barrows, the other 64 were assigned to the Bronze Age. Lacking sufficient dating evidence it would perhaps be wise to consider all of these sites as belonging to the period band Late Neolithic to Late Bronze Age. (Roman and Early Medieval barrows may show a similar form, but there is no positive evidence to suggest that any of the barrows under discussion belonged to these periods).

The majority of the barrows were in the Trent/Tame flood plain south of Burton upon Trent, with most of the others in this general area only slightly elevated in relation to the valley floors. Three distinct concentrations of barrows lay outside the river valleys, each more prominently sited than the Trent/Tame sites. The Swarkestone Lows group Jay circa 35 metres above the river on a small but well defined gravel ridge. A second group (FR.159.1) 3.5 km south east of Swarkestone Lows was similarly sited. A third group (FR. 156.23) near Heather had no riverine connections and lay at 125 m above OD near the top of a slope only 15 m above a small valley. The Heather group comprised only three small ring ditches (10 m, 12 m and 17 m), the largest of which contained a second, concentric ring ditch.

In all there were 9 barrows with double concentric ditches, five with diameters in the range 11 m to 15 m, one at 18 m and three at 20 m. A single example, with 3 ditches, had an inner diameter of 10 m and a maximum diameter of 38 m (FR.18.52.1).

The general size range for all the barrows is from 3 m to 34 m, but there is a dichotomy with a drop in numbers in the 13 m to 17 m band (see fig. 13). Three of the barrows (FR.165.1.1,5 and 6) were described as LARGE MACULAE (15 m to 50 m), with two drawn at approximately 20 m and one at 30 m. Two others were described as LINEAR FEATURES (FR.6.7.3 and FR.42.13.4),. and flagged as possible enclosures, and had probable diameters of around 30 m and 20 m respectively.

A further 33 records with the interpretation "enclosure" (listed under Unassigned, 4.1.11) may also be barrows. These enclosures were all whole or partial ring ditches with diameters in the same range as those of the barrows (3 m to 34 m). The distribution of these enclosures is very similar to that of the barrows with the exception of a small group of three in the Dove valley (FR.98.6), a blank area on the barrows distribution plot. Two of the enclosures in this group were incomplete ring

ditches but the third was one of the sub-class of polygonal enclosures discussed below.

A small group of 17 enclosures was identified, each essentially sub-circular in plan, but apparently constructed by linking a number of straight sections of ditch. 13 were interpreted as barrows. The size range for the majority, 15, of these enclosures is from 10 m to 32 m (fig. 13), but with none having diameters between 12 m to 18 m (see barrows discussion above). The remaining two polygonal enclosures are 45 m (FR.38.6.2) and 55m (FR.9.52.5) in diameter, the latter occurring in apparent association with 4 ring ditches.

The number of straight sections making up these polygonal enclosures was variable and in some cases not clear enough to count, but six or more seemed applicable to the majority, with the largest diameter site also having the greatest number of straight sections, with ten.

Most of the polygonal sites discussed above occurred in association with ring ditch barrows, the two exceptions being the large enclosure FR.38.6.2, and the smaller FR.34.2.1. The latter feature had seven well defined sides and a large central macula. The CUCAP card index refers to this site as a temple, though it is not recorded as such by any other authority. It is possible that this was a Romano-Celtic temple but its apparent isolation from other archaeological features, along with its lack of an entrance and the presence of the large central macula, suggest that it might have been a "mausoleum". One other polygonal enclosure (FR.165.9.2) was quite clearly octagonal in plan and also had a polygonal internal ditch. This site was part of the largely "ritual" landscape (Bronze Age - Iron Age) around Swarkestone and could conceivably also have been a Romano-Celtic temple.

Two records bear the interpretation "pit circle" (FR.13.12.1 and FR.17.13.1). Both these features came from poor quality oblique photographs and have very low validity scores. FR.13 .12.1 was little more than an arc of pits but FR.17 .13.1 was almost a complete circle of circa 14 m diameter.

Two further pit-defined features FR.9.41.1 & 2 deserve comment. Both sites are in MONARCH (SK 11 NE 30) and the Staffordshire SMR (records 203, 1397) and are scheduled as "Early Prehistoric ceremonial monuments" (Staffs 215 and 216). The MONARCH record includes a comment to the effect that FR.9.41.2 may be a mini-henge (derived from Harding, 1987). An interpretation of henge seemed the most appropriate, though not entirely satisfactory choice for both features. The 1: 10,000 scale of transcription makes very difficult the graphic depiction of sites like these, which are defined by the: patterning of micro-features, in this case patterns of small postpits (probably between 1 m to 1.5 m dia.). The less complete FR.9.41.2 (c.37 m max. diameter) was seen as lines of pits (up to 5 pits per line) radiating out from a central ring ditch (c. 13 m diameter) but the lines did not radiate from a single point. In its original form this :site probably consisted of 5 rings of pits with the adjacent pits in each line aligned radially. The larger and more complete FR. 9 .41.1, with a maximum diameter of 42 m across its 5 rings of pits which were oval rather than circular, with an inner diameter c.24m, and no central ring ditch, is comparable to the inner element of Woodhenge, Wiltshire (40 m dia.) which had 6 rings. The south circle at Durrington Vl alls also had 6 rings of pits but a maximum diameter just short

of 20m. FR. 9.41.1 is also remarkably similar to the underlying "multi-ring timber structure" (40 m diameter) of Navan site B, Co. Armagh dated to 95- 94 BC (Robe11son, 1992), though there is no intention to suggest that the two are chronologically related.

FR.32.1.3 is a possible causewayed ring ditch with a diameter of 30 m and appeared to form a group with two continuous ring ditches. FR.41.37.1 was the only good example of a causewayed ring ditch in the project area, with a diameter of 20 m and three equally spaced causeways interrupting a fairly substantial ditch.

One site is morphologically unique within the project area and lay on the Trent flood plain south of Burton, part of a rather fragmented crop-mark landscape. The site, FR. 86 .15.1, was an oval, double ditched enclosure with external dimensions of 38 m x 18 m and has been interpreted as a mortuary enclosure. The interior of this enclosure was approx. 18 m x 6 m and had a large pit-like feature at one end. The obvious morphological affinities are with the long barrow, and more specifically the mortuary enclosure, traditions. But this site lies outside the common areas of occurrence for both these site types (Ashbee, 1970).

Historic sites in the Religious, Ritual and Funerary c:lass were notably lacking, the only representations being made by two GROUPS, FR.198.7 (Grace Dieu Priory), FR.21D.3 (Ulverscroft Priory) and a record for the chapel at Tutbury castle. At Grace Dieu Priory the remains have been field surveyed (NAR SK 41 NW 3) so only a skeletal description was given in MORPH2 with the building remains all being encompassed by a single record. Uncertainty concerning the relationship of the priory remains with other earthworks in the immediate vidnity caused the interpreter to describe these features in a different GROUP (FR.198.8). At Ulverscroft the priory buildings are well preserved, partly incorporated in a modem dwelling and were not transcribed. The recorded remains for this priory consist of a moat and three fishponds.

4.1.9 Transport

SITE INTERPRETATIONS

CANAL	4	records
CANAL BASIN	2	records
CAUSEWAY	1	record
FOOTPATH	4	records
HOLLOW WAY	6	records
RAILWAY	2	records
ROAD	4	records
TRACKWAY	119	records
TRAMWAY	24	records
TRAMWAY BRIDGE*	1	record
Total	**163**	**records**

GROUP INTERPRETATIONS

ROAD	2	records
Total	**2**	**records**

Relatively few industry related transport features were recorded and for the same reasons as stated in 4.1.5 above. A notable exception (FR.140. 8.1 & 2) was a two-branched tramway (more correctly a horse tramroad in this case) built in AD 1793 as part of the Charnwood Forest branch of the Leicestershire canal. Several sections of the Charnwood Forest canal were recorded across two maps but the MORPH2 numbers do not reflect their common origin (FR. 197.4. 1 , FR.198.3.1 & 2 and FR.221.1.1 & 2) or their relationship with the tramway discussed above. The canal burst in AD 1799 and parts of it were subsequently overlain by a railway, built in AD 1844, now itself a disused line. Though much of its route is traceable by following the contours, large sections of the canal were not visible on the photographs.

A linear feature (FR.182.4. 9) was interpreted as part of an extensive tramway system built in the early eighteenth century to serve the limekiln complexes around Calke Abbey, however it may have been an engineered carriage way running to/from Staunton Harold Hall.

"Trackway" was the most commonly used interpretation in this class. Despite more than half the trackways being assigned to the Post-Medieval or Unknown Medieval periods all but a handful were seen as crop marks (92 or over 77 %), a much higher percentage than other types of Medieval crop mark.

4.1.10 Water and drainage

SITE INTERPRETATIONS

DAM	3	records
DRAIN	30	records
DRAINAGE SYSTEM	8	records
FISHPOND	25	records
LEAT	24	records
MILL POND	12	records
MILL RACE	6	records
ORNAMENTAL POND	2	records
POND	30	records
RESERVOIR	1	record
TAIL RACE	1	record
WATER CHANNEL	1	record
WATERCOURSE	7	records
Total	**156**	**records**

Ponds of one: sort or another totalled 70 records in this class while those features such as leats totalled only 39. There were many more ponds and leats within the project area some of which were recorded from the OS map search, but in general only those that were not readily identifiable on the map base were transcribed. It was also apparent that industrial expansion had destroyed many of this sort of feature in the late 19th early 20th centuries (i.e. between OS 1st edition survey and 1940s RAF aerial surveys).

Drainage systems and drains were generally not transcribed unless they were difficult to disentangle from other archaeological features or exceptionally, if they were morphologically ambiguous (FR.125.1.1 & 2).

4.1.11 Unassigned, civil, commemorative, commercial and objects.

SITE INTERPRETATIONS

BANK	5	records
BOUNDARY	87	records
BOUNDARY BANK	4	records
BOUNDARY DITCH	8	records
BUILDING	30	records
BUILDING PLATFORM	4	records
DITCH	3	records
DYKE	9	records
ENCLOSURE	416	records
GEOLOGICAL MARKS	6	records
GOAL POST ENCLOSURE*	2	records
MOUND	4	records
PIT	23	records
PIT ALIGNMENT	46	records
PIT CLUSTER	3	records
PLATFORM	1	record
TREE HOLE	1	record
UNKNOWN*	122	records
Total	**768**	**records**

GROUPINTERPRETATIONS

ENCLOSURE	1	record
Total	**1**	**record**

Sites in this class accounted for 31 % of the project MORPH2 database. All the sites listed in this section are included under the "unassigned" category, mainly because the authors felt unable to give these sites more functionally explicit interpretations.

The general breakdown of the 768 sites shows that 92 % were described as either an ENCLOSURE or LINEAR FEATURE. There were 122 sites with "unknown" as the interpretation, of which 110 were described as LINEAR FEATURES. Of the total "unknowns", 70 sites (just over 57%) have a validity score of 2 or less.

Enclosures amounted to 54 % of the total for this class and many of them also displayed uncertainty over period (70% with Unknown, Unknown Medieval or Unknown Prehistoric). On the other hand, 69% of the 416 have a validity score of 3 or more, implying that the existence or acceptability of these sites as enclosures was not in question. Of those sites interpreted as enclosures, 82 % were described via the ENCLOSURE table., 16.5 % via the LINEAR FEATURE table, with 5 sites described as LINEAR SYSTEMS and 1 as a MACULA. These enclosures could belong to almost any of the classes in this section but in all probability most will belong under the Agriculture and Subsistence, Domestic, or Religious, Ritual and Funerary classes. Enclosures as a morphological type will be discussed in 4.2.1.

The large triple ditched enclosure FR.17 .4.1, was in the NAR and the Staffordshire SMR as a Neolithic causewayed enclosure, however, the generally good specialist photography for this site shows that the triple ditches are simply not completely visible, and that those sections which are, show no sign of deliberate breaks (fig. 14).

4.2 MORPHOLOGICAL REPORT

4.2.1 MORPH2 Types

Enclosures	578
Linear systems	166
Linear features	1324
Maculae	314
Industrial complexes	3

N.B. While every effort is made to be as accurate as possible the limitations of methodology and scale mean that the dimensions given for any MORPH2 record are relative and should be treated with extreme caution. Whilst the MORPH2 record will always attempt to accurately reflect the actual dimensions of small features such as ring ditches, there is an unavoidable tendency to draw such features slightly oversize on the transcription.

In order to facilitate the thematic synthesis a good deal of morphological observation has already been made in sections 4.l.1 to 4.1.11 and is not repeated in this section. Cross references are made to the thematic section when necessary.

The overall topography of the area is such that the ASPECT field seems to be of little relevance. There were many sites with aspect "ALL" but most of these were in the river valleys which are essentially broad and flat with only 45 of the "ALL" sites situated on hill top locations (in all 60 sites had this location).

4.2.2 Enclosures

The database contains a total number of 578 ENCLOSURE records with a further 125 sites described as LINEAR FEATURES and flagged as probable enclosures. 59% of the overall total (703), were given the "unassigned" interpretation "enclosure" while 55 % were given Roman or earlier as their period.

There were 260 curvilinear ENCLOSURES. A further 19 LINEAR FEATURES may be curvilinear enclosures. 92 (35 %) of all the curvilinear ENCLOSURES were simply interpreted as enclosures. Of the 260 curvilinear ENCLOSURES, 117 (45%) have been interpreted as barrows. 75 of the remaining 143 curvilinear ENCLOSURES were morphologically and dimensionally similar to the barrow sites and a total of 42 of these have "Unknown" or "Unknown Prehistoric" as their period and were simply interpreted as enclosure (see 4.l.8).

225 (86 %) of all curvilinear enclosures were seen as crop marks of ditches 31 32 and of those, 153 (59%) were described as sub-circular in shape. Sub-circular was the most common curvilinear shape option with a total of 163 (63 %). Other shapes were represented as follows: circular 19, oval 12, regular 37 and 29 N/APP (i.e. "not applicable", the default for enclosures described as asymmetric). In each case more than 80% of the sites were ditches seen as crop marks.

There were 318 rectilinear ENCLOSURES, and a further 88 linear features which were potentially, rectilinear enclosures. 223 (70 %) of the rectilinear enclosures were seen as crop marks of ditches and 178 (56%) of these were described as rectangular in shape. The shape options chosen for all rectilinear enclosures were: rectangular 216, polygonal 77, square 24 and triangular 1.

The presence of curved comers in a rectilinear enclosure may indicate that it was a primary or core unit and less likely to be a random survivor of a conjoined system of like enclosures. It is reasonable to assume that such enclosures may have had a central role, such as settlement nuclei, in at least a local context. Of those enclosures which were either rectangular or square 126 also had curved comers. With the filter expanded to remove all Late and Post Medieval enclosures 95 remain with periods from Iron Age - Early Medieval (but including Unknown Medieval and Unknown). Five of these sites are eanthworks including three moats (Unknown Medieval) and Bury Camp (Iron Age/Roman); the remaining 90 sites are crop marks, 20 dated Roman and most of the rest, 67, split between the three "unknown" periods. There are also 33 polygonal enclosures with curved comers in the same period group. Several of these enclosures (square, rectangular and polygonal) were apparently associated with hut circles and other features, suggestive of Iron Age/Roman settlements or farmsteads; a total of 27 were thought to be Roman, but only 10 came under the GROUP interpretations "settlement" or "farmstead". Many of the remaining 93 enclosures with an "Unknown ... " period would also be acceptable as Late Prehistoric farmsteads/settlements.

A total of 26 ENCLOSURES or possible enclosures have "hill top" as their location. Ten of the hill top enclosure sites (7 rectilinear, 3 curvilinear) constitute the Iron Age/Romano-British settlement sited on a gravel ridge overlooking the river Trent at Swarkestone Lows (FR.165 .14). Of the remaining 16 (7 rectilinear, 9 curvilinear) there did not appear to be any significant groupings or any common factor other than their location.

Analysis of the approximate internal area of enclosures can be done for all sites with fully recorded dimensions (i.e. a diameter, or length and breadth; 424 SITES). 187 of these ENCLOSURES have diameters in the barrow size range (1 m to 35 m or in terms of area 3 m2 to 907 m2) and a high proportion of these probably were barrows (see above 4.1.8). All of these 187 are excluded from the following discussion.

Of the other 237 enclosures, 109 (46%), with measurements given as length and breadth, lie in a similar band (16 m2 to 900 m2) to the barrow sized enclosures. 58 of the 237 enclosures have Post-Medieval or Modern as their period while 120 have either Unknown, Unknown Prehistoric or Unknown Medieval as their period. Figure 15 shows the area size range within these "unknowns" almost all only interpreted as "enclosure"; the range is from 32 m2 to 13,650 m2 with 58 (48%) of the enclosures lying within the same band as the barrow sized ENCLOSURES (1 m2 to 907 m2). A further 44 (37%) enclosures have an area in the range 901 m2 to 3000 m2. Further analysis, splitting these sites on whether they are rectilinear or curvilinear produces no significant change e.g. 32 of the "unknowns" are curvilinear while 88 are rectilinear; of the curvilinear "unknowns" 16 (50%) lie between 125 m2 to 900 m2 and of the rectilinears 42 (48%) lie in the 32 m2 to 900 m2 band.

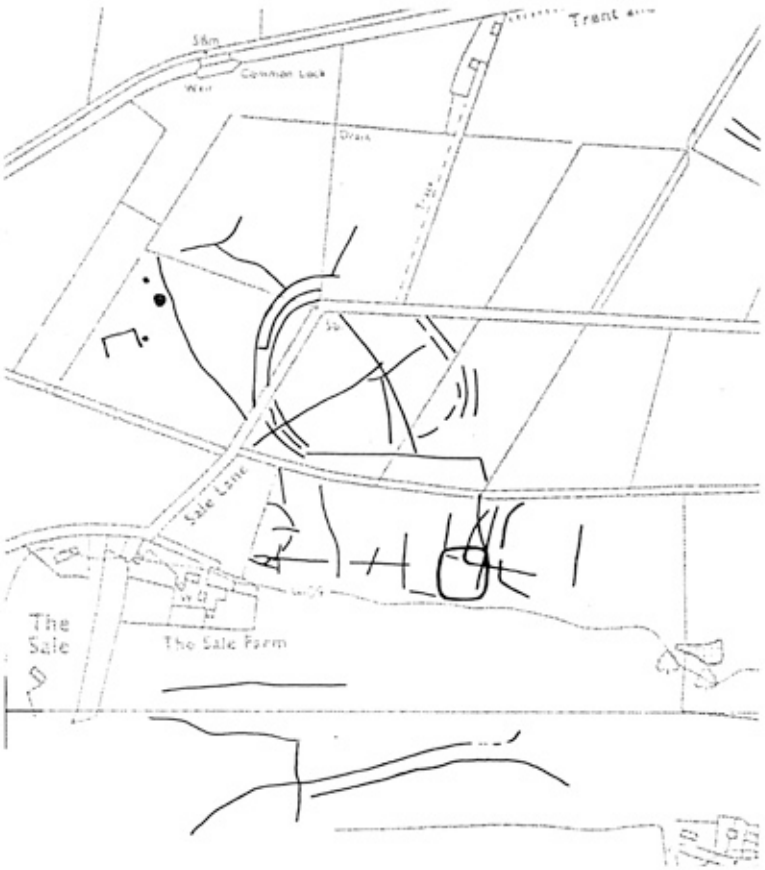

Figure 14. The triple ditches of this large enclosure appear to be continuous and not causewayed as previously thought. Scale 1:10,000

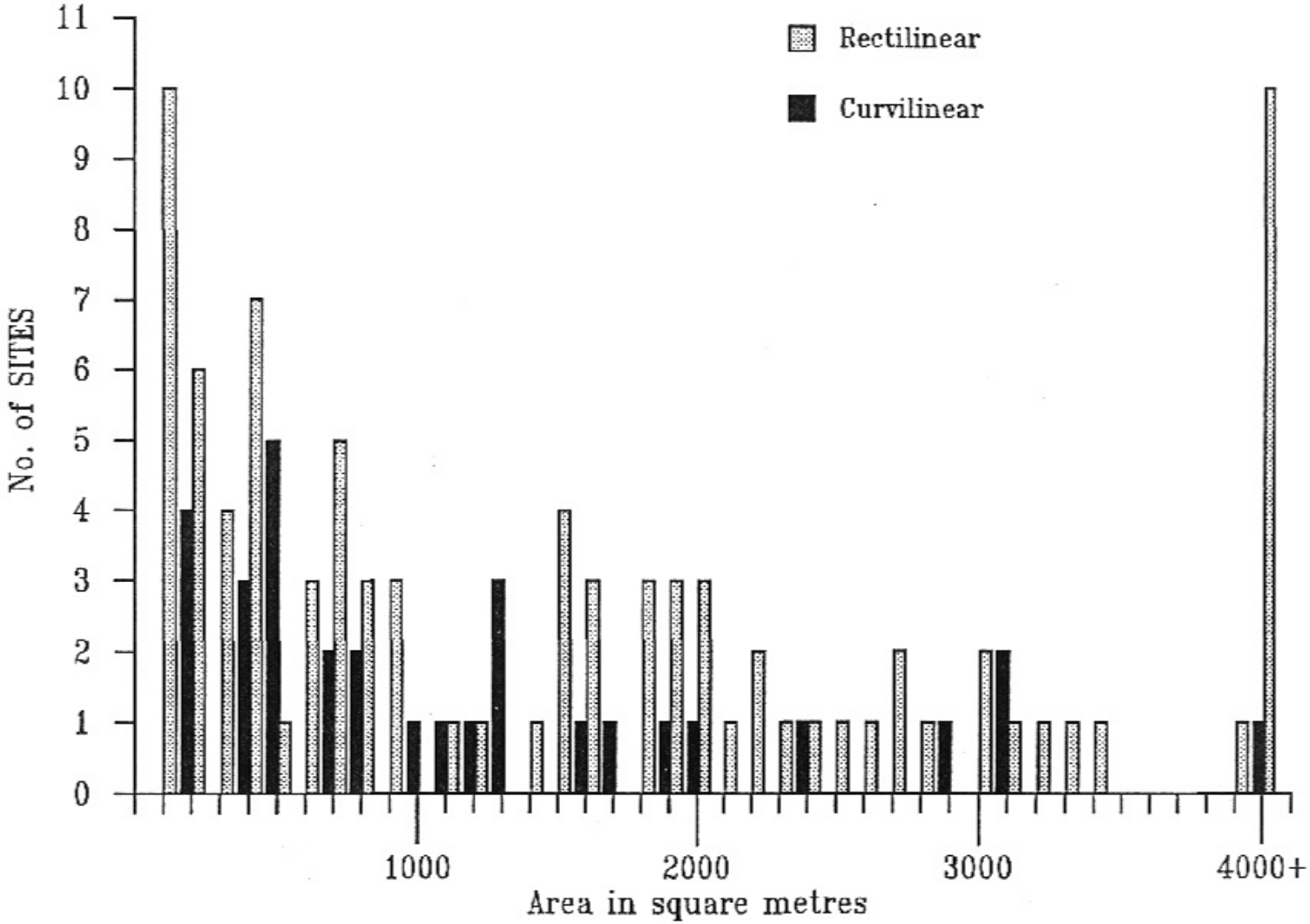

Figure 15. Graph of enclosure areas. Curvilinear enclosures in the barrow size range (1m - 35m) have been excluded.

This consistent trend towards the same band (1 m2 to 900 m2), with no other common factor apparent, may be common to other NMP project databases. Many of the larger enclosures are probably no more than single fields or livestock enclosures but some like FR.17 .4.1, a possible Neolithic enclosure, may have other more unique functions.

Entrances - 78 of the ENCLOSURES had gaps in their defining elements which have been interpreted as entrances. There were a total of 94 entrances, five enclosures having 2, five had 3 and one had 4 entrances. The most frequent shapes associated with an entrance were rectangular, with 27 and sub-circular with 24. The most frequent entrance form was "terminal defined" with 84 occurrences. Entrance position showed a slight trend to the east quadrant with 52 between north-east, east and south-east while the west quadrant had 32. There were only 5 entrances with north and 5 with south as their position. Filtering out the later historic enclosures did not alter this balance, resulting in 43 in the east quadrant and 24 in the west. Seven possible enclosures with entrances were flagged in the LINEAR FEATURE table; 4 entrances were located in the eastern quadrant and 2 in the west (I each north and south).

Two pit-defined enclosures, FR.41.18.1 & 19.1, are described in section 4.1.1.

4.2.3 Linear Systems

There are 166 LINEAR SYSTEMS in the database. 142 LINEAR SYSTEM records describe ridge and furrow. There are a further 24 LINEAR SYSTEM sites which are unrelated to ridge and furrow cultivation. Of the non- ridge and furrow systems the majority, 20, have a RECTILINEAR PATTERN and 15 of the 24 are ditched. Eleven of the 24 are field systems of various types, including the three pit-defined systems discussed in 4.1.1. Nine of the 24 are enclosure complexes as defined in appendix A of the MORPH2 Users Guide (RCHME, 1993).

The nine enclosure complexes have unit sizes in the range from c.200 m^2 to c.4200 m^2 and all except the deserted village of Croxall (FR.19.15.2) are ditch defined. Apart from two which are of "mixed" pattern they are essentially rectilinear complexes. In accordance with the enclosure size range those above 900 m2 are increasingly likely to have a strictly agricultural or other, non-domestic function. Since these are all conjoined systems of enclosures those over the 900 m2 limit are most probably field systems. Other likely Medieval village sites in this set are FR.76.8.2 and FR.217.6.3. FR. 9.44.1 is the enclosure complex at Catholme Early Medieval settlement while 1 km to the south west FR. 9.50.1 has been interpreted as a Roman or Romano-British farmstead. Note that the enclosure sizes for this site (circa 4200 m2) appear to exceed those at Catholme (circa 3000 m2. The very fragmentary enclosure system FR.195.3.2 appeared to have a linear arrangement of fields and enclosures on either side of a trackway and was unlike any other system in the project area.

4.2.4 Linear Features

There are 1324 LINEAR FEATURES in the database. 731 were Medieval or later agricultural features of one sort or another e.g. boundary banks, field boundaries, fragments of ridge & furrow. Only 40 were of Prehistoric date and 45 are of Unknown date.

With most LINEAR FEATURES (at this scale) the length is their only measurable dimension, but it is frequently not possible to tell whether or not the feature is wholly visible. The basic rule is that the longest part of the LINEAR FEATURE is measured" .. .in so far as it is visible" (see MORPH2 definition of length) and this must be borne in mind when considering the validity of any analysis based on LINEAR FEATURE length.

With a filter set to remove all features with an interpretation in the list "field boundary, ridge & furrow, field system, and drainage system" the lengths of the remaining 662 sites range from 8 m to 4000 m (fig. 16). The main band with 493 sites (74%) runs from 1 m to 220 m tailing off gradually to circa 410 m (17 %), beyond which there are mostly single representations at various lengths up to the 4000 m maximum. The sites in the tail-off bands are typically trackways, tramways, canals, leats mill races and airfield runways, with only 6 of the sites above 220 m flagged as possible enclosures (see below). For comparison all the "FIELD BOUNDARY" LINEAR FEATURES, 422 in all, were examined separately. The field boundaries occur in the range 15 m to 810 m with a slight peak around 150 m and a very gradual tail off becoming apparent at circa 260 m to 390 m, beyond which are a few, mostly single occurrences to the range maximum. It is possible that the top end of the majority band (i.e. 150 m to 260 m, 176 sites) indicates original full lengths though obviously many of the shorter field boundaries will also represent true original lengths.

There are 91 LINEAR FEATURES which are flagged as possible enclosures and they have a surprisingly long range, from 12 m to 700 m (fig. 16). The majority of the enclosures, 82, actually lie between 12 m to 150 m. Some of these measurements will equate to an enclosure length or breadth but since LINEAR FEATURES are measured from end to end (i.e. around corners) most of the flagged enclosures will be smaller than the given length suggests. The few possible enclosures which are longer than 150 m are mostly accounted for by 2 sections of moat and 3 lengths of park pale, the other features are interpreted as enclosure, 2, "dyke" and "unknown".

One of the Linear Features flagged as an enclosure (FR.165 .11.2) was a cropmark ditch which lay on the Trent flood plain perpendicular to an old river course and may have formed two sides of a large enclosure with one side defined by the river itself (see fig. 32). This feature apparently enclosed a group of smaller enclosures and ring ditches. It may also be associated with other features circa 100 m to the east, including a pit alignment which also appeared to originate at the old river course and paralleled the ditch for some 200m. This feature is similar to the Iron Age ditch, also with a pit alignment relationship, which partially enclosed the Swarkestone Lows barrows circa 1 km to the north-east. In the wider context there were similarities with the enclosures (Neolithic) which lay in the Kennet valley floor between the West Kennet long barrow and Silbury Hill in Wiltshire (RCHME, APU plan, unpublished).

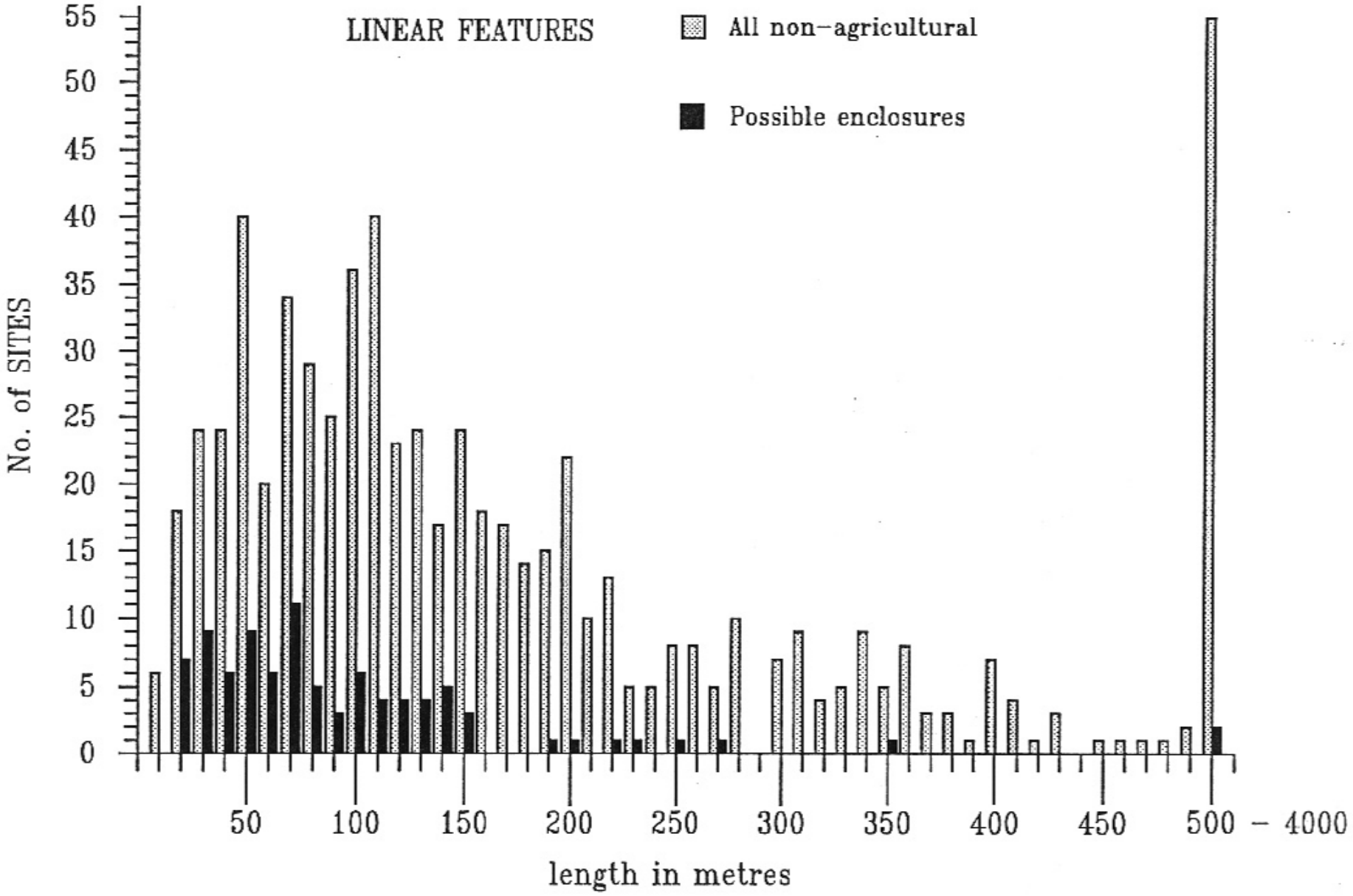

Figure 16. Graph of LINEAR FEATURE lengths with those flagged as enclosures shown separately.

Two of the flagged LINEAR FEATURES were interpreted as barrows and a further 5 were morphologically and dimensionally similar (though 1 of these had the interpretation "boundary"). For a more detailed analysis of the barrows see 4.1.8.

The "dyke" (FR.237.3.3) is less likely to be part of an enclosure than a flood defence, but it was possibly associated with the adjacent moat (FR.237.3.1 - 2).

There are 8 LINEAR FEATURES which between them had a total of 10 gaps which have been interpreted as entrances. 7 of these LINEAR FEATURES were flagged as possible enclosures and have been given "enclosure" as their interpretation, the remaining feature (FR.41.17.2) was interpreted as a field boundary and was associated with a pit alignment (FR.4l.17.1).

Of the 320 LINEAR FEATURES recorded as earthworks (excepting ridge and furrow) 179 were defined by ditches, 99 by banks, 10 by foundations, 31 were combinations of ditch and bank and 1 had a bank and foundation combination.

There were a few crop-mark LINEAR FEATURES which may be triple ditched dykes. Two of these features (FR.18.6.1 & 2) paralleled each other, circa 650m apart, and ran perpendicular to an old course of the river Tame, crossing a long gravel island on which they appeared to underlie an extensive Romano-British landscape (see relationship with the north - south trackway FR.18.12.1, fig. 29, opp. page 52). FR.19.19.1 was a short length of triple ditch in which each ditch took a rather sinuous course with scant reference to the others, until they splayed apart at the western end of the feature. A short length of single ditch opposed the splayed end and may have belonged to a related feature. A fragmentary but long (600m) stretch of triple-ditch (FR.75.1.1) had at least one single ditch springing from it and may have forked at the east end to create two double-ditched linears. The last "dyke" was not actually a triple ditch (though lack of photographic definition caused it to be described as such) but was, at least in part, a ditch flanked by pit alignments CFR. 40 .15.1). The possibility that the above feature aligned with a length of triple-ditch (FR.40.15.3) 500 m to the north was reinforced by the discovery on verticals of a very short, albeit double-ditch section (FR.40.15.2) mid-way between them (Extreme right on fig. 29).

4.2.5 Maculae

The database contains a total of 314 MACULA descriptions, or 1032 individual maculae, as calculated from the MCD _ NUM field. Note that in some cases, particularly the multiple "shaft" records, the given figure reflects the number of identifiable individual maculae in a much larger area of disturbance and as such falls far short of the real number.

There are no obvious correlations between PATTERN, FORM or SIZE but the most common combination, equalling 50% of the total, is that they are single MACULAE showing as negative features. There are only 7 records which are "very small", i.e. less than 1m which may be due to the primary source for much of the project area being vertical aerial photographs which have insufficient resolution to allow the recovery of the smaller maculae.

The interpretation "shaft" covers the largest single body of maculae with 38 records incorporating 226 individual shafts. 23 of the 38 records are single shafts, which leaves 203 shafts covered by 15 records, most of which have the undiagnostic option "random" as their pattern.

4.2.6 Industrial Complexes

A total of three sites were described as INDUSTRIAL COMPLEXES. In two cases (FR.124.3.1 and FR.124.5.1) the only features present were shafts and as such each of these sites should have been described as a MACULA. No figures are available for the number of shafts in each record but they were large areas (1550 m x 550 m and 420 m x 240 m respectively) which together must have contained several hundred shafts. The third site (FR.134.28.1) was a coal and clay mine some 420 m x 270 m, with a network of roads, two shafts and their associated spoil heaps.

4.2.7 Possible new classes

Only the polygonal enclosures (see 4.1.8.) stood out as a potentially new site type. Even so, prior to this project, these were nearly all known to the record and accepted as the ploughed out remnants of round barrows. They are therefore, more of a variation of an established class than an entirely new class of monument, but are no less interesting for that. A brief documentary search failed to identify other examples beyond the project area but re-examination of photographs of known ring ditches and barrows would no doubt identify other polygonal enclosures/barrows.

The two pit-defined enclosures discussed in section 4.1.1 were thought to be unusual and are worth consideration as representatives of a distinct monument class. No attempt was made to identify parallels elsewhere in the country.

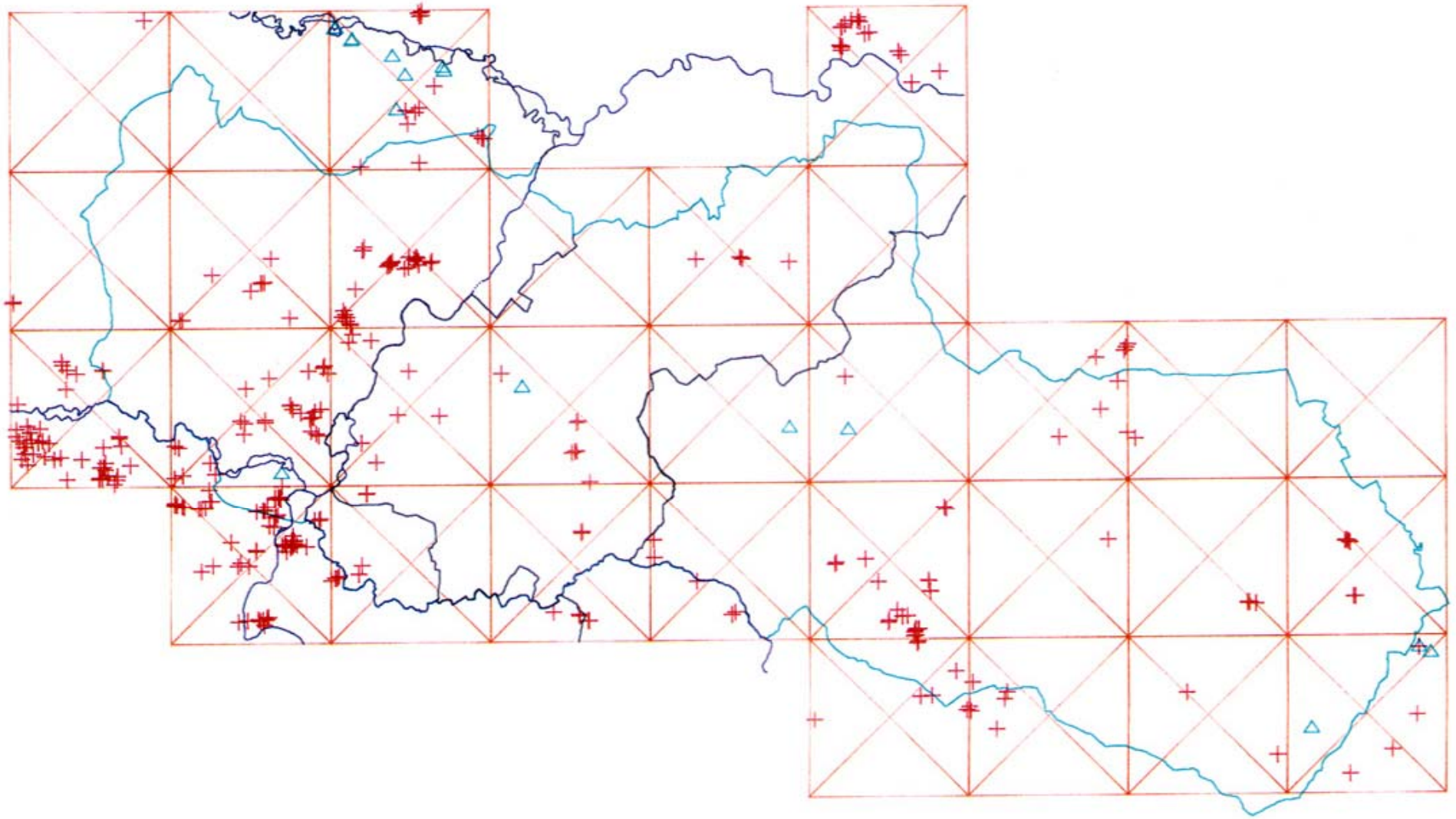

Figure 17. Distribution of Unknown period sites. Red crosses = crop marks and green triangles = earthworks.

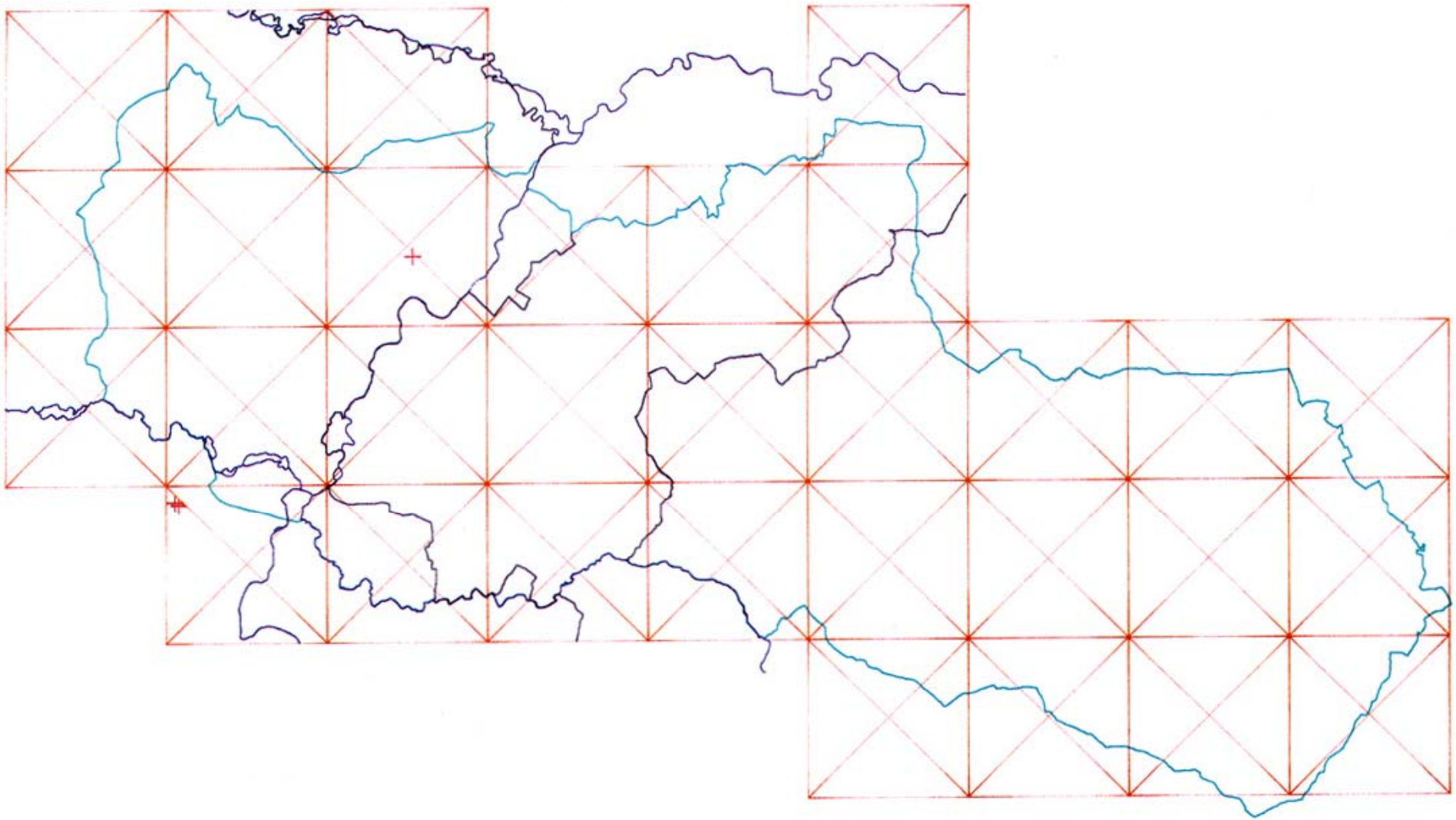

Figure 18. Distribution of Neolithic period sites. Red crosses = crop marks and green triangles = earthworks.

4.3 PERIOD SUMMARIES

4.3.1 Unknown

Interpretation	
BANK	1 record
BOUNDARY DITCH	18 records
BOUNDARY	4 records
BUILDING	1 record
DRAIN	2 records
ENCLOSURE	83 records
FIELD BOUNDARY	22 records
FIELD SYSTEM	5 records
GEOLOGICAL MARKS	6 records
LEAT	1 record
MILL POND	1 record
PIT	8 records
PIT CLUSTER	1 record
POND	3 records
QUARRY	1 record
ROAD	2 records
TRACKWAY	12 records
UNKNOWN *	74 records
Total	**245 records**

The sites of unknown period account for just over 10% of the database (fig. 17 for distribution). Some of the features/sites in the list above could be reassigned, at least to Unknown Medieval, with confidence e.g. the leat, the mill pond and several of the various linear features. Other features are properly assigned to this period e.g. the geological marks, included in the database either to avoid the possibility that they be mistaken for archaeology in the future or because they have already been mis-interpreted as archaeological features elsewhere.

4.3.2 Pre-Neolithic

There are no sites in the database that are known to belong to this period.

4.3.3 Neolithic

Interpretation		
BOUNDARY	1	record
ENCLOSURE	1	record
MORTUARYENCLOSURE	1	record
Total	**3**	**records**

No long barrows are known in the area but some of the round harrows and other features may be Neolithic in date (see 4.1.8). The enclosure, FR.17.4.1, is not a causewayed enclosure as previously thoug.ht, but could still be Neolithic (see 4.1.11). Figure 18 shows the distribution of Neolithic sites.

4.3.4 Bronze Age

Interpretation		
BARROW	64	records
CAUSEWAYED RING DITCH	1	record

ENCLOSURE	1	record
HENGE	2	records
HILLFORT	1	record
MOUND	1	record
RAMPART	1	record
Total	**72**	**records**

The majority of records in this period are "ritual" sites. the lack of "domestic" sites being notable. The barrows, with very few exceptions, were represented by crop-mark ring ditches in the river flood plains and are discussed in detail in section 4.1.8. Figure 19 shows the distribution of Bronze Age sites.

4.3.5 Iron Age

Interpretation

BOUNDARY:	5	record,
BOUKDARY DITCH	I	record
ENCLOSURE	6	records
FIELD BOUNDARY	1	record
FIELD SYSTEM	4	record
FORT	1	records
HUTCIRCLE	3	record
PIT ALIGNMENT	42	record
RAMPART	5	records
TRACKWAY	4	records
UNKNOWN·	1	record
Total	**73**	**records**

Records assigned to this period (fig. 20 for distribution) are dominated by the pit alignments, hut it must be said that their dating is far from certain. At Swarkestone Lows the Bronze Age barrow cemetery was enclosed by an Iron Age ditch possibly replacing the double pit alignment to its north (sec fig, 32. page 48). East of King, Bromley a pit defined field system. FR.40.1.1, and a barrow cemetery. FR.40.25. overlap and are therefore not likely) 10 be contemporary (see top right of fig. 28, back pocket). Perhaps, there is a period/cultural distinction between the pit-defined linears, such as at Swarkestone Lows, and the pit-defined systems like those around Kings Bromley.

Fortified sites have a reasonable representation (see 4.1.2) but have all been recorded previously and in more detail.

There is a good spread of class types with Agriculture and Subsistence well represented (see 4.1.1 and comments on pit alignments above) but notably absent are Religious, Ritual and Funerary sites.

4.3.6 Roman

Interpretation

BOUNDARY	5	records
ENCLOSURE	51	records
FARMSTEAD	1	record
FIELD	1	record
FIELD BOUNDARY	7	records
HUT CIRCLE	11	records

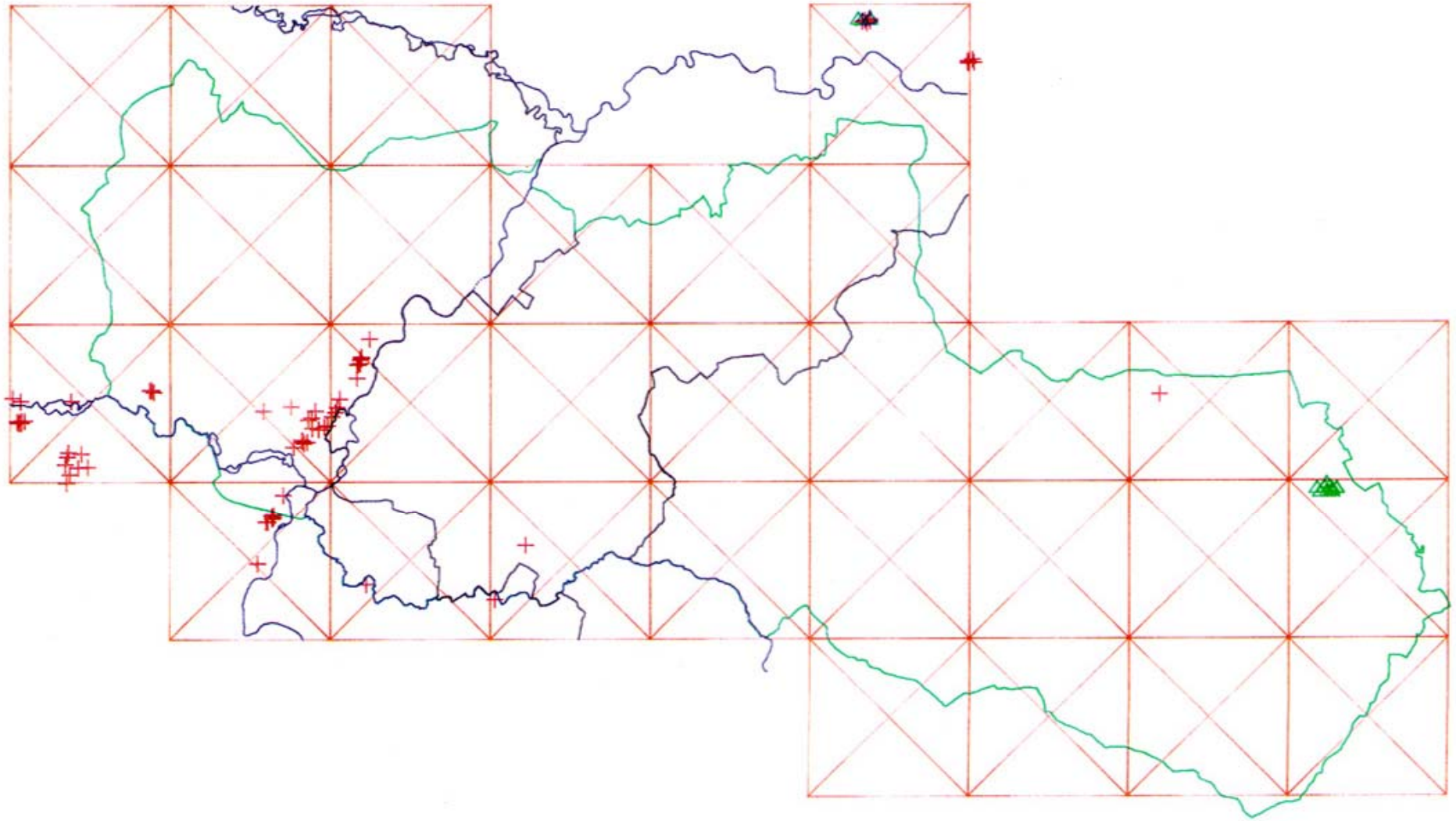

Figure 19. Distribution of Bronze Age period sites. Red crosses = crop marks and green triangles = earthworks.

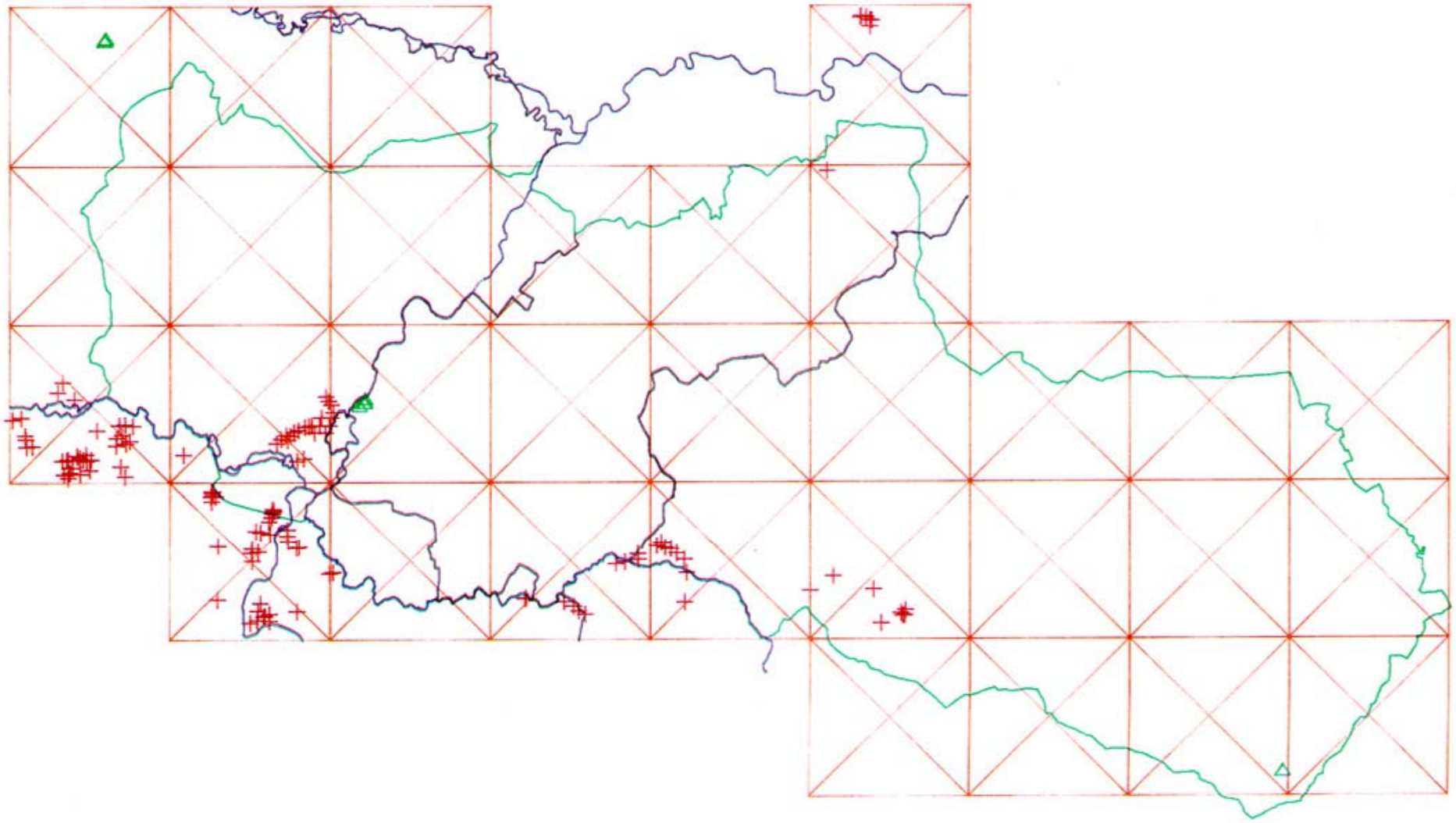

Figure 20. Distribution of Iron Age period sites. Red crosses = crop marks and green triangles = earthworks.

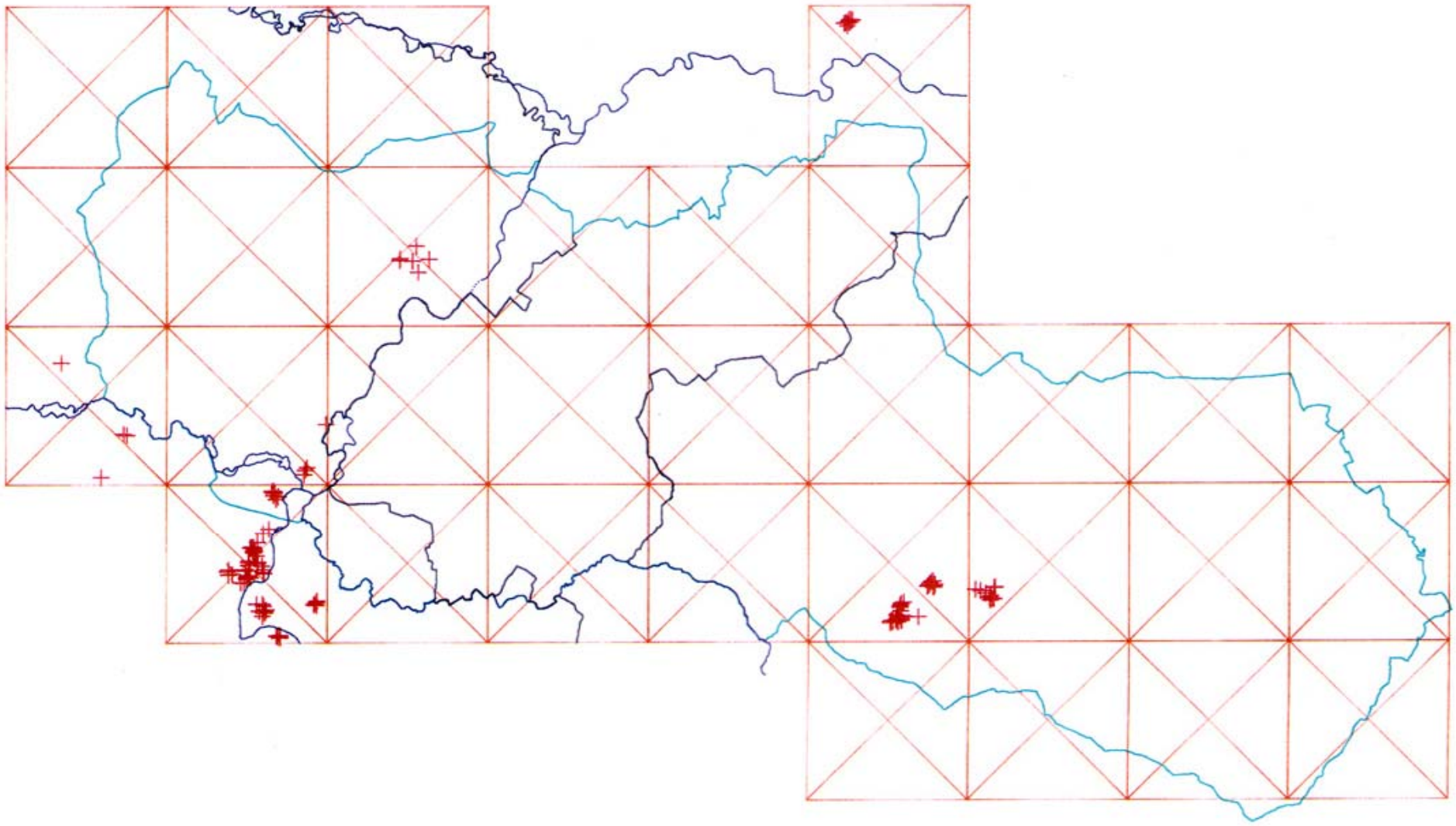

Figure 21. Distribution of Roman period sites. Red crosses = crop marks and green triangles = earthworks.

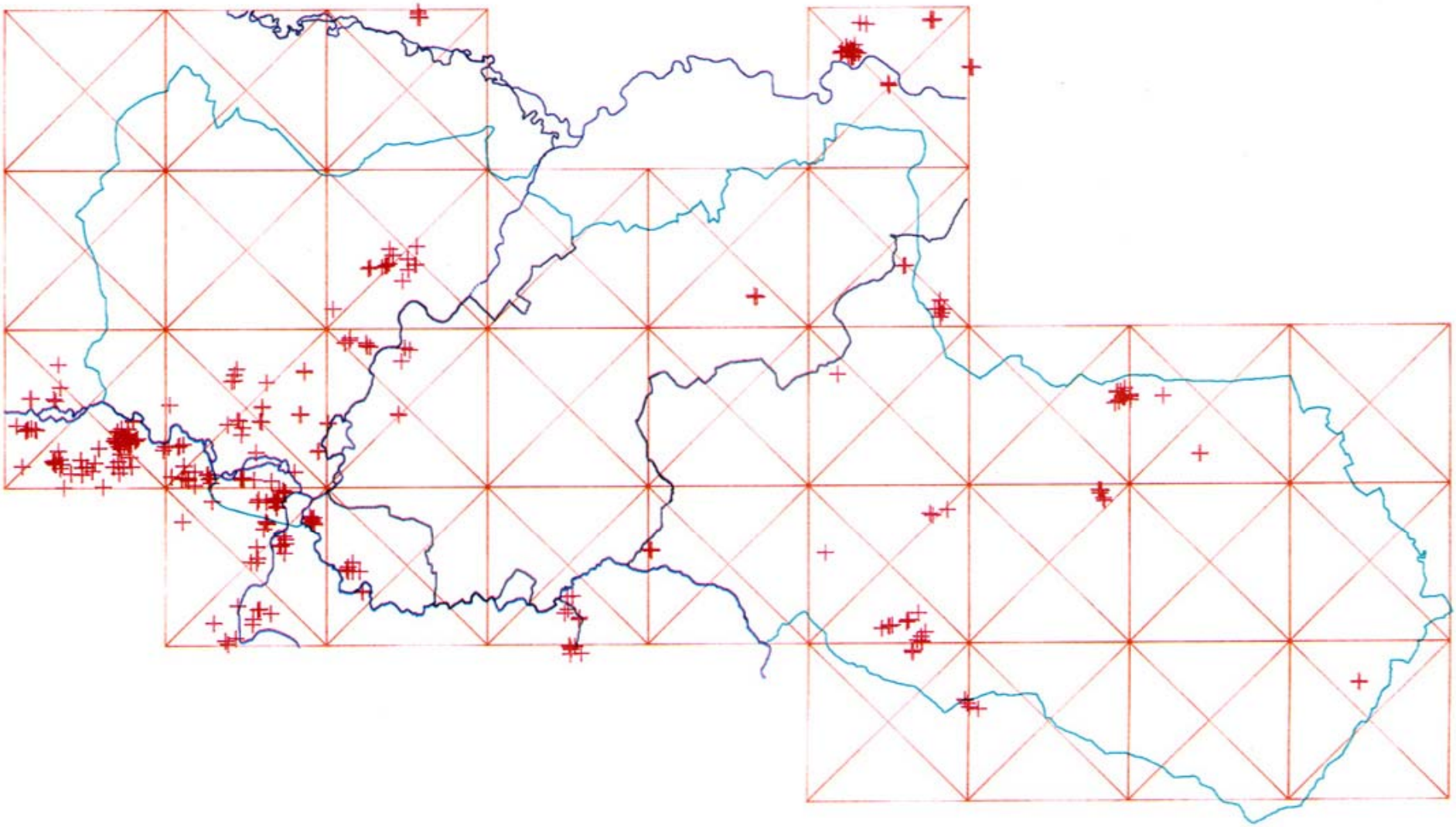

Figure 22. Distribution of Unknown Prehistoric period sites. Red crosses = crop marks and green triangles = earthworks.

PIT	2	records
ROAD	2	records
STOCK ENCLOSURE	1	record
TEMPLE	1	record
TRACKWAY	15	records
UNKNOWN*	3	records
VILLA	2	records
Total	**102**	**records**

There are no Roman military sites recorded in the area by this project. The sites listed here, including the villa, FR.18.9.1 & 2, are largely from one extensive Romano-British landscape in the Tame valley (see 4.3.13. Figure 21 for distribution). The temple FR. 34.2.1, is perhaps the most notable site of this period but should be considered in the context of the polygonal enclosures discussed in 4.1.8.

4.3.7 Unknown Prehistoric

Interpretation

BARROW	59	records
BOUNDARY	13	records
BOUNDARY DITCH	1	record
CREMATION CEMETERY	1	record
DYKE	8	records
ENCLOSURE	144	records
FIELD BOUNDARY	6	records
FIELD SYSTEM	1	record
GOAL POST ENCLOSURE*	2	records
HUT CIRCLE	5	records
PIT	9	records
PIT ALIGNMENT	4	records
PIT CIRCLE	2	records
PIT CLUSTER	1	record
TRACKWAY	16	records
UNKNOWN*	10	records
Total	**282**	**records**

Most, if not: all of the barrows could be considered as Bronze Age (see 4.1. 8). Most of the enclosures are in this period list because they were of an undiagnostic plan and were not associated with other recognized site types (see section 4.2.2). Figure 22 shows the distribution of Unknown Prehistoric sites.

4.3.8 Early Medieval

Interpretation

BOUNDARY	1	record
BUILDING	2	records
ENCLOSURE	5	records
FARMSTEAD	1	record
GRUBENHAUS	1	record
MOAT	1	record
UNKNOWN *	1	record
Total	**12**	**records**

The Anglo-Saxon site at Catholme in the Trent valley did not show as crop marks and was drawn from excavation plans and aerial photographs taken when

excavation was in progress. Why this site was not visible as crop or soil marks is not apparent but is a reminder that many sites (of all periods) may remain invisible in what would usually be considered an optimum environment for crop mark development. Figure 23 shows the distribution of Early Medieval sites.

4.3.9 Medieval

Interpretation

BAILEY	4	records
BOUNDARY	4	records
BUILDING	2	records
CASTLE	1	record
CHAPEL	2	records
CROFT	3	records
CULTIVATION TERRACE	1	record
DESERTED VILLAGE	2	records
ENCLOSURE	18	records
FIELD SYSTEM	10	records
FISHPOND	12	records
HOLLOW WAY	3	records
LYNCHET	2	records
MOAT	10	records
MOTTE	3	records
ORNAMENTAL TERRACE	1	record
PARK PALE	3	records
PILLOW MOUND	1	record
PLOUGH HEADLAND	13	records
POND	3	records
QUARRY	1	record
RIDGE AND FURROW	226	records
SANDSTONE QUARRY	1	record
TOFT	4	records
TRACKWAY	5	records
UNKNOWN *	2	records
WATER MEADOW	2	records
Total	**359**	**records**

There is a general lack of domestic sites for this period, in particular deserted village remains (see 4.1.3). The number of ridge and furrow records would have been higher had crop and soil mark incidences been recorded. Important recent discoveries have indicated that some of the coal-mining remains generally ascribed to the Post Medieval period are in fact Medieval (see 4.1.5). Figure 24 shows the distribution of Medieval sites.

4.3.10 Post Medieval

Interpretation

AVENUE	1	record
BANK	3	records
BEACON	1	record
BELLPIT	1	record
BOUNDARY	14	records
BOUNDARY BANK	4	records
BOUNDARY DITCH	2	records
BOWLING GREEN	1	record

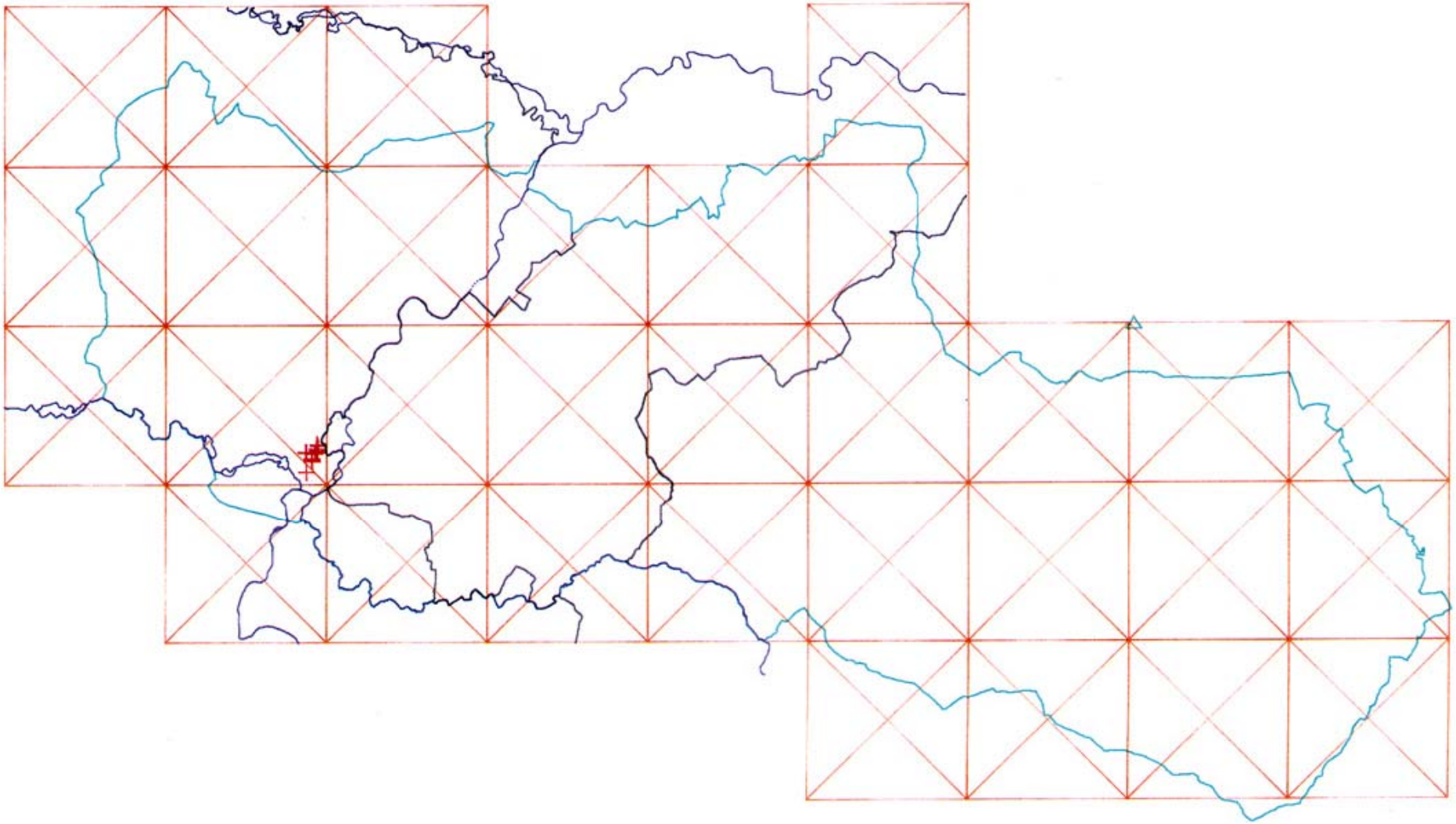

Figure 23. Distribution of Early Medieval period sites. Red crosses = crop marks and green triangles = earthworks.

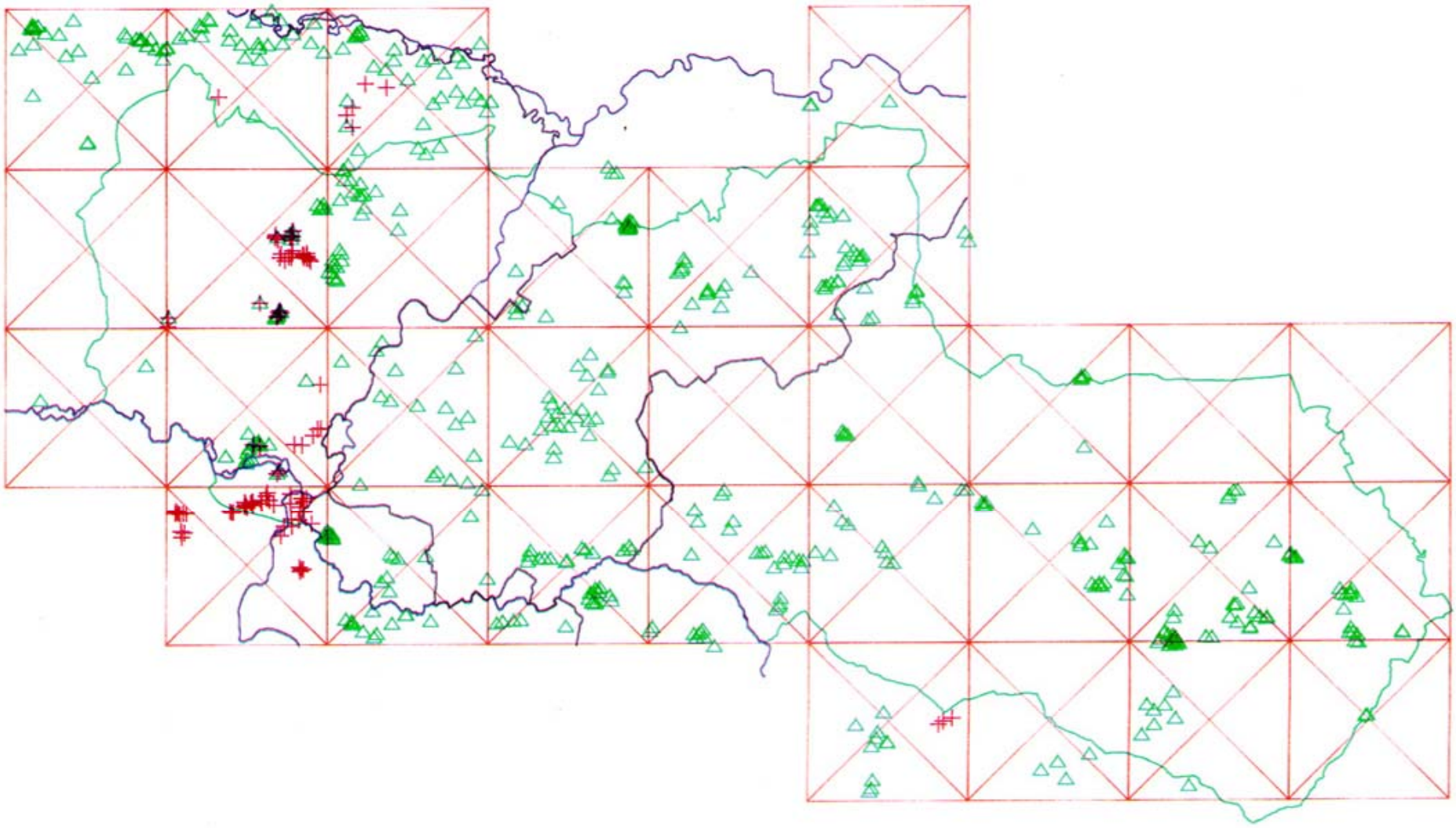

Figure 24. Distribution of Medieval period sites. Red crosses = crop marks and green triangles = earthworks.

BRICK PIT	1	record
BUILDING	21	records
BUILDING PLATFORM	3	records
CANAL	4	records
CANAL BASIN	2	records
CAUSEWAY	1	record
CLAY PIT	3	records
COAL MINING*	2	records
COAL WORKINGS	3	records
CORN MILL	1	record
CULTIVATION MARKS	2	records
CULTIVATION TERRACE	1	record
DAM	3	records
DITCH	2	records
FIELD BOUNDARY	20	records
DRAIN	19	records
DRAINAGE SYSTEM	6	records
ENCLOSURE	39	records
EXTRACTIVE PIT	8	records
FARMHOUSE	1	record
FARMSTEAD	2	records
FIELD	4	records
FIELD BOUNDARY	306	records
FIELD SYSTEM	11	records
FISHPOND	11	records
FOOTPATH	4	records
GARDEN	6	records
GRAVEL PIT	1	record
GYPSUM QUARRY	14	records
HOLLOW WAY	2	records
HORSE WHIM	1	record
HOUSE	1	record
KILN	4	records
LEAT	22	records
LIMESTONE QUARRY	9	records
MILL POND	10	records
MILL RACE	6	records
MINE	1	record
MOAT	6	records
MOUND	3	records
ORNAMENTAL POND	2	records
ORNAMENTAL TERRACE	2	records
OSIER BED *	2	records
PARK PALE	3	records
PILLOW MOUND	2	records
PIT	1	record
PLANTATION*	4	records
PLATFORM	1	record
PLOUGH HEADLAND	3	records
POND	17	records
QUARRY	31	records
RAILWAY	2	records
RESERVOIR	1	record
RIDGE AND FURROW	121	records
RIFLE BUTTS	2	records

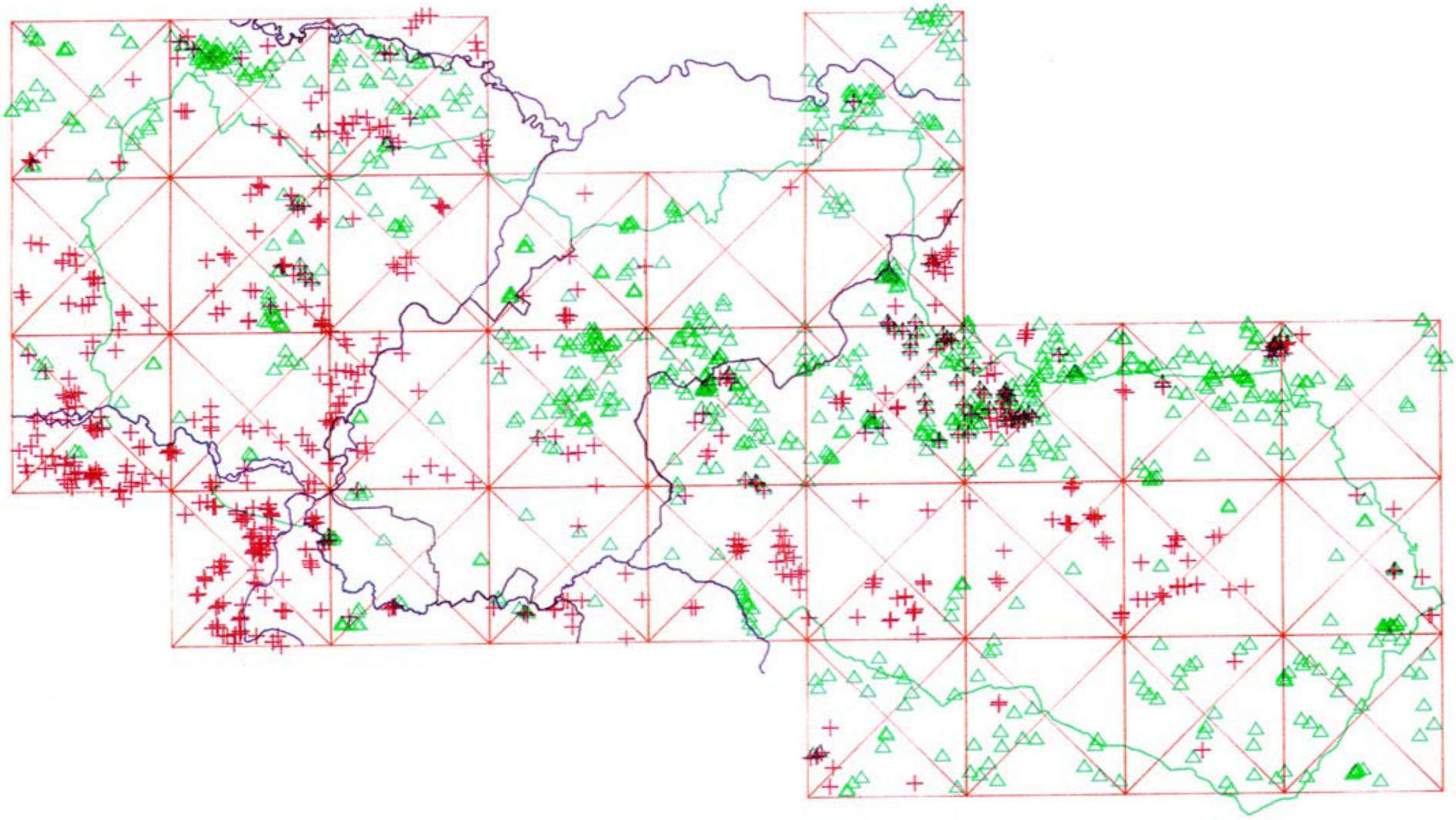

Figure 25. Distribution of Post-Medieval period sites. Red crosses = crop marks and green triangles = earthworks.

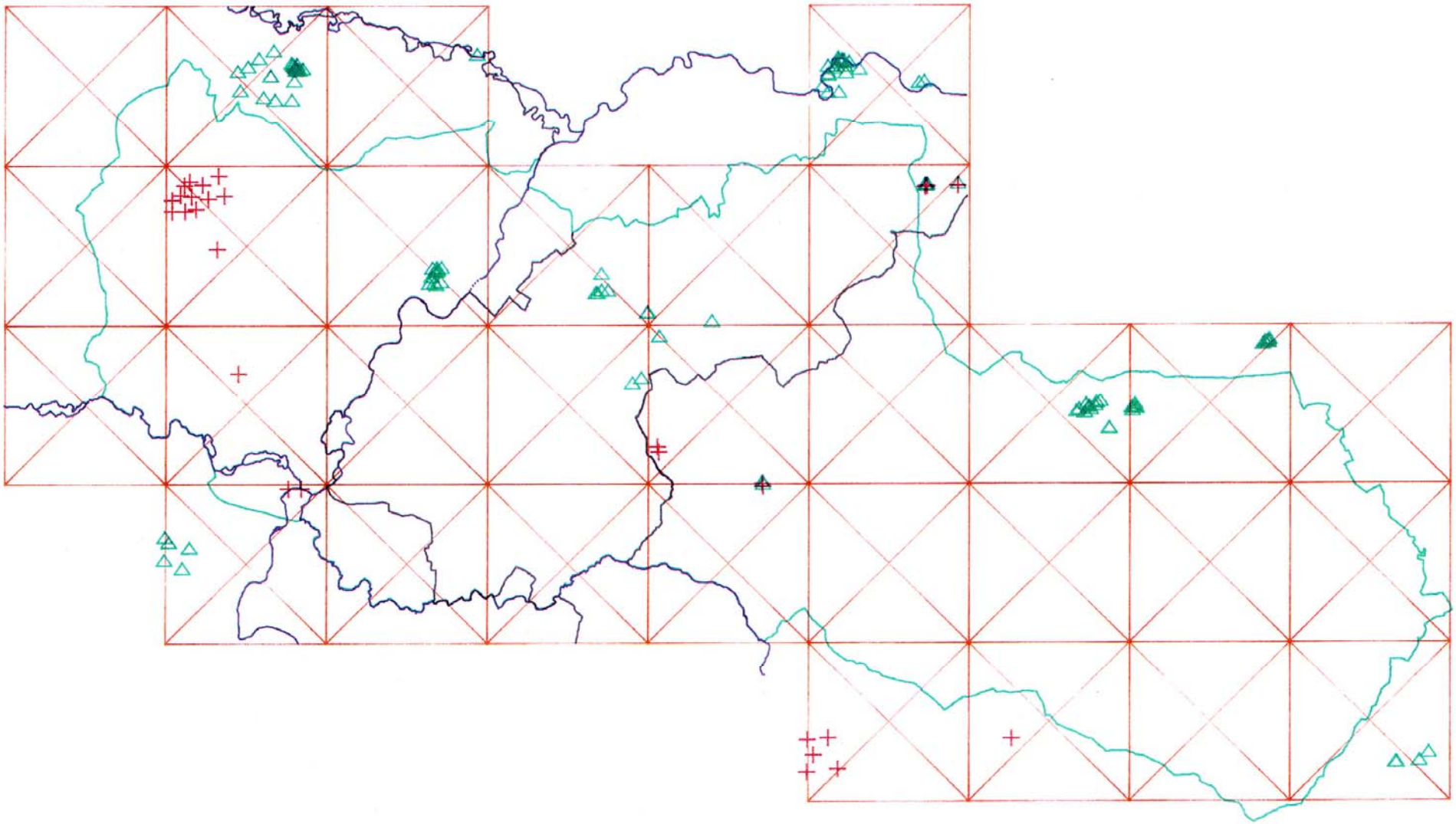

Figure 26. Distribution of Modern period sites. Red crosses = crop marks and green triangles = earthworks.

SAND PIT	2	records
SANDSTONE QUARRY	6	records
SHAFT	37	records
SPOIL HEAP	5	records
STACK STAND	1	record
SUBSIDENCE*	5	records
TAIL RACE	1	record
TRACKWAY	39	records
TRAMWAY	23	records
TRAMWAY BRIDGE*	1	record
TREE AVENUE	3	records
TREE ENCLOSURE RING	2	records
TREE HOLE	1	record
UNKNOWN*	16	records
WATER CHANNEL	1	record
WATERCOURSE	2	records
WINDMILL	1	record
WINDMILL MOUND	4	records
WOODLAND BOUNDARY*	3	records
Total	**920**	**records**

There is a broad range of sites for this period not least because most of the industrial records in the database are assigned to it, although some are now known to be earlier (see 4.1.5). The records for this period also encompass a good range of agricultural sites, while various garden and landscaping features are also noted. Figure 25 shows the distribution of Post Medieval sites.

4.3.11 Twentieth Century

Interpretation

AIRRAIDSHELTER	7	records
AIRCRAFTOBSTRUCTION*	9	records
AIRFIELD	2	records
BOMBCRATER	2	records
BUILDING	2	records
BUILDINGPLATFORM	1	record
CLAYPIT	1	record
DRAIN	3	records
ENCLOSURE	3	records
FIELDWORK	5	records
GRAVELPIT	2	records
GUNEMPLACEMENT	3	records
MAGAZINE	6	records
MILITARYBASE	1	record
PILLBOX	3	records
POND	1	record
SEARCHLIGHTBATTERY	3	records
SLITTRENCH	3	records
TRACKWAY	4	records
TRAMWAY	1	record
UNKNOWN*	1	record
Total	**63**	**records**

The records for the twentieth century are primarily of the classes "Defence" and " Industrial" though in both classes the recovery rate was lower than expected (see: 4.1.2 & 4.1.5). Figure 26 shows the distribution of Twentieth Century or "Modem" sites.

4.3.12 Unknown Medieval

Interpretation		
BAILEY	1	record
BANK	1	record
BOUNDARY	26	records
BUILDING	2	records
DITCH	1	record
DRAIN	6	records
DRAINAGE SYSTEM	2	records
DYKE	1	record
ENCLOSURE	65	records
FIELD BOUNDARY	61	records
FIELD SYSTEM	3	records
FISH POND	2	records
GRAVEL PIT	4	records
HOLLOW WAY	1	record
LEAT	1	record
MILL POND	1	record
MOAT	6	records
MOTTE	1	record
PARK PALE	1	record
PIT	2	records
PIT CLUSTER	1	record
PLOUGH HEADLAND	2	records
POND	6	records
POST MILL	1	record
QUARRY	4	records
RIDGE AND FURROW	5	records
SALT WORKS	1	record
SANDSTONE QUARRY	1	record
SHAFT	1	record
TRACKWAY	24	records
UNKNOWN *	14	records
WATERCOURSE	5	records
WINDMILL MOUND	1	record
Total	**254**	**records**

As with the other "unknown ... " periods many of the sites listed might be reassigned to more specific periods with the benefit of hindsight. There are no sites of particular note in this period list. Figure 27 shows the distribution of Unknown Medieval sites.

4.3.13 Multi-period sites

Chronologically extensive palimpsests are not really a feature of this area, multi-period "sites" or landscapes in the National Forest appear to be restricted to narrow period bands e.g. Bronze Age - Iron Age. There are, however, a few areas which are worth highlighting. All of the following are crop-mark sites and all, at least in part, have previously been transcribed and recorded in the county SMRs.

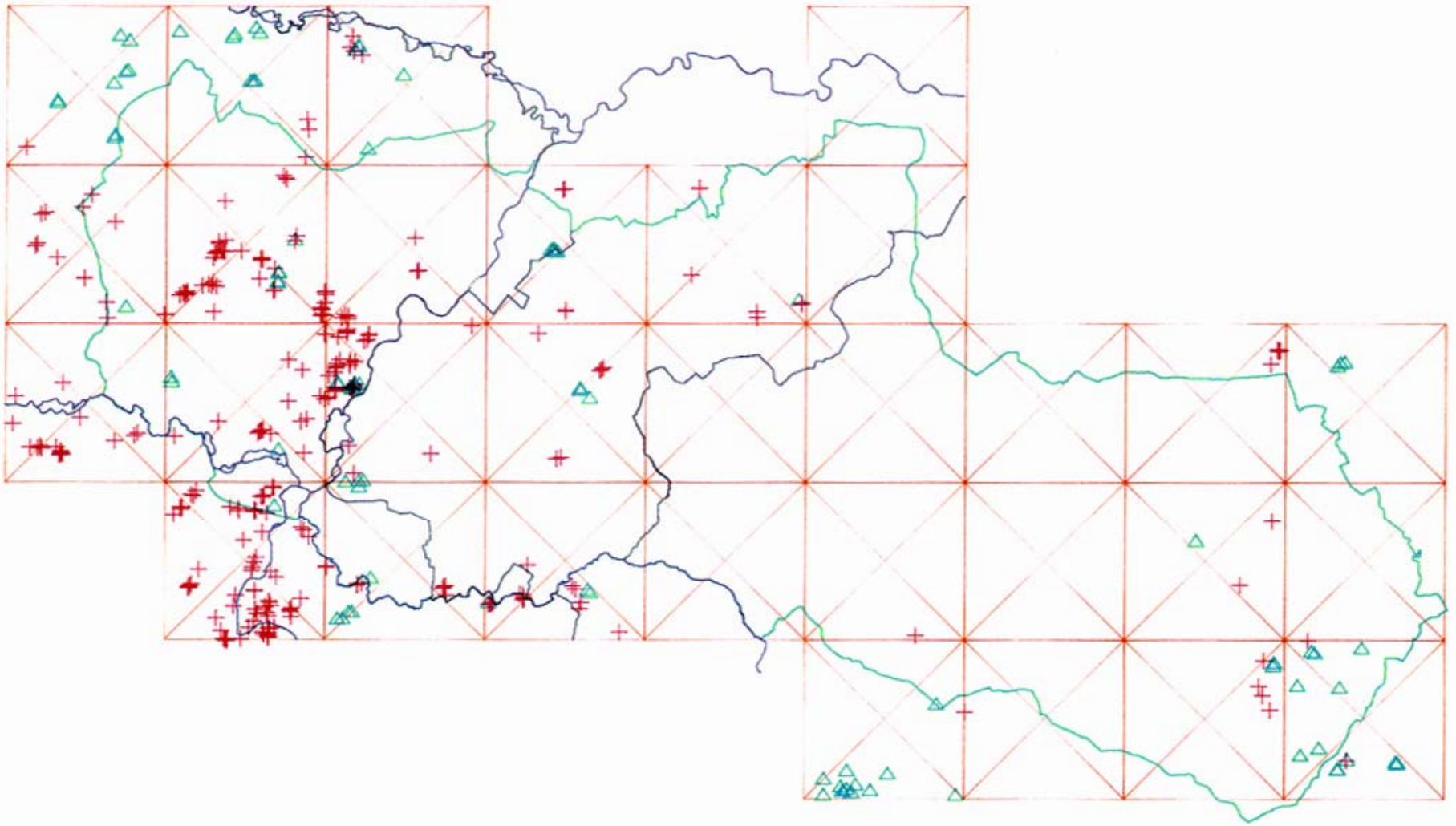

Figure 27. Distribution of Unknown Medieval period sites. Red crosses = crop marks and green triangles = earthworks.

Figure 28. Kings Bromley

Figure 29. Alrewas.

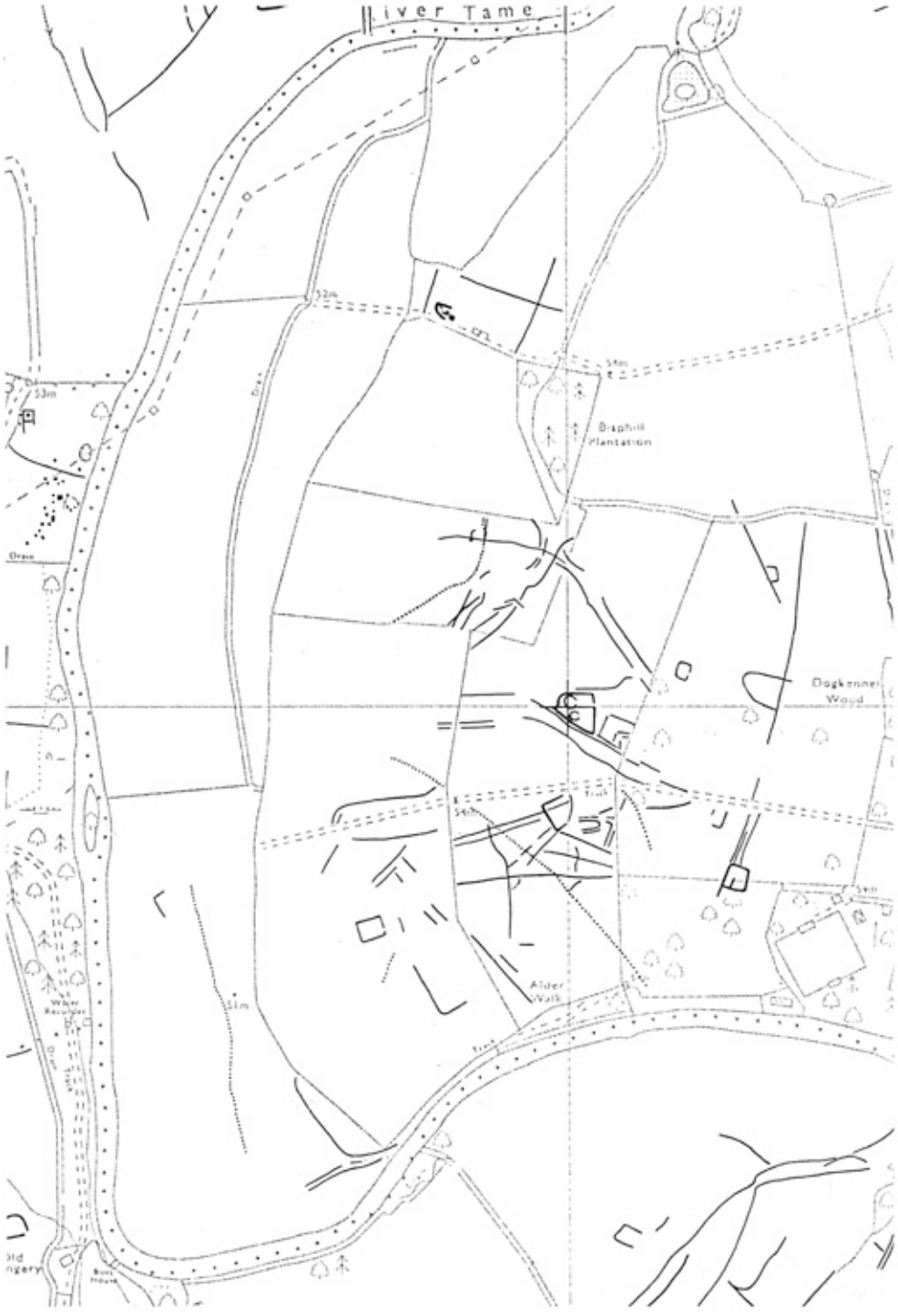

Figure 30. Elford. Scale 1:10,000

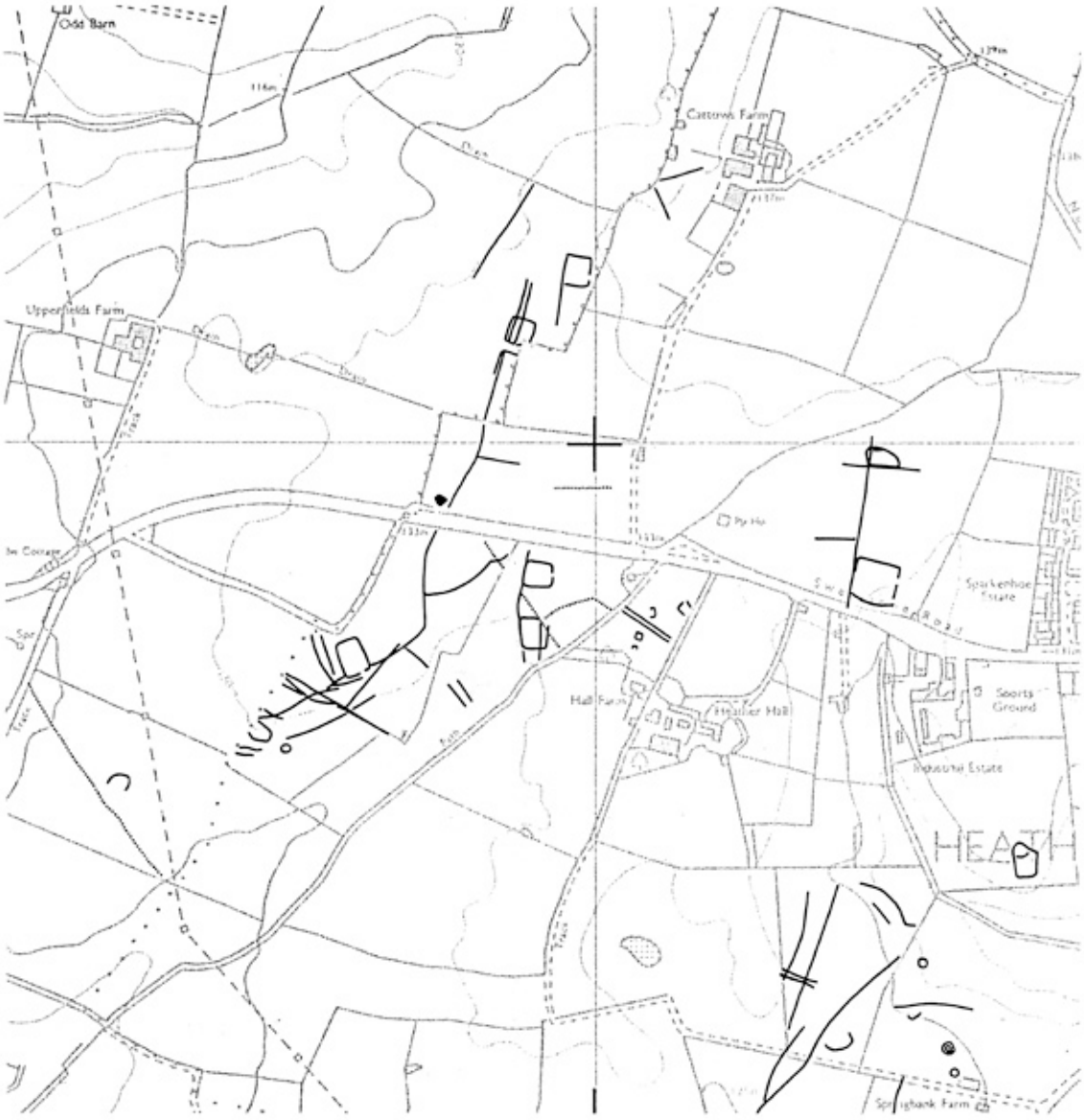

Figure 31. Heather. Scale 1:10,000

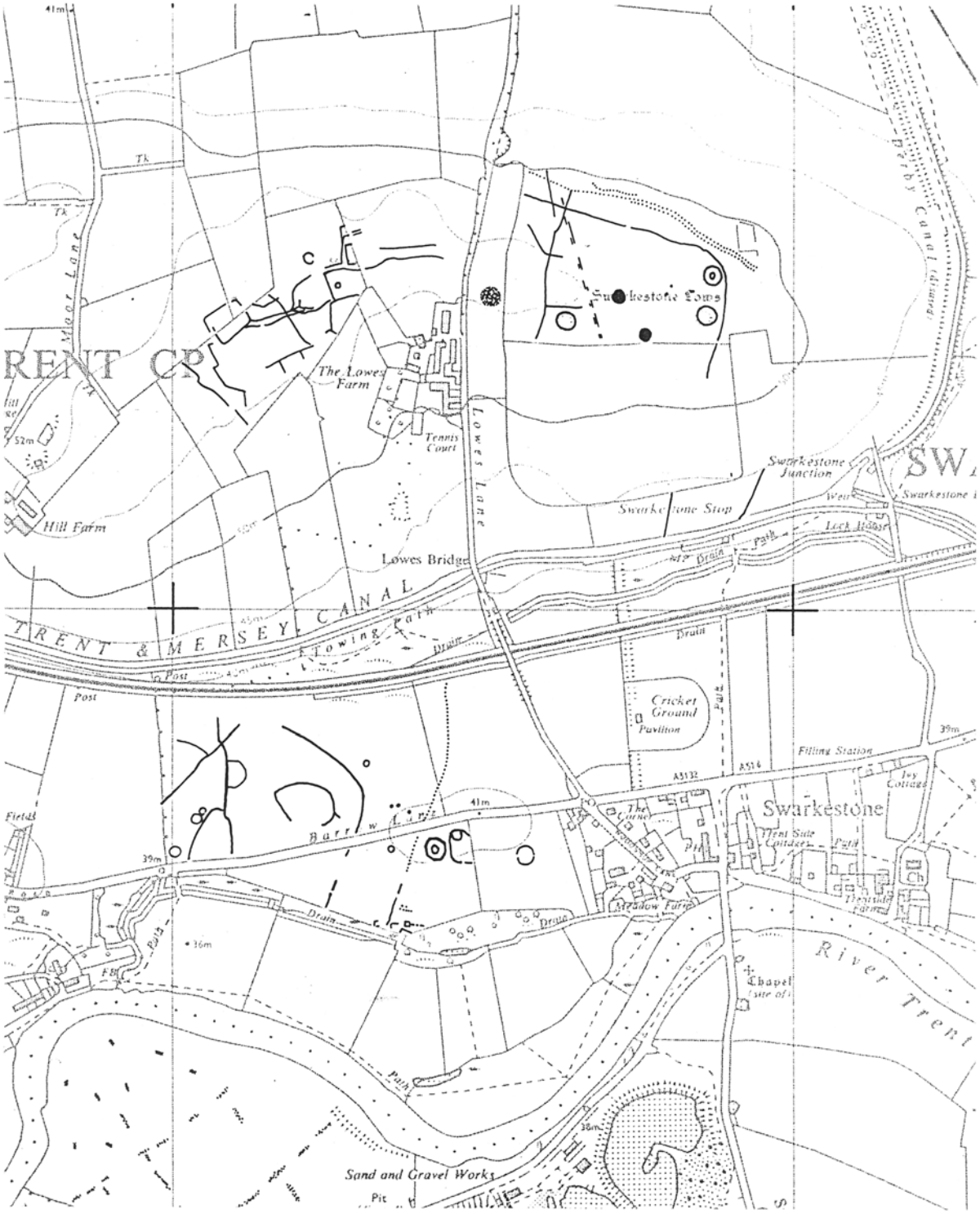

Figure 32. Swarkestone. Scale 1:10,000

King's Bromley (fig. 28) - to the east, south and west of King's Bromley on SK 11 NW, were three areas of crop marks, which together can be considered as a single landscape covering an area of approximately 4 km x 2 km. This landscape was characterised by the (Iron Age?) pit alignments which in places formed very regular and coherent field systems and by the (Bronze Age?) ring ditches, many of them actually polygonal. There were some enclosures possibly indicative of Romano-British settlement and several other enclosures including two which were pit-defined, that were of uncertain function and period. There was also a triple dyke (Iron Age?, central ditch flanked by pits) and many other linear features hinting at land division of several different phases. This landscape comprises the bulk of MORPH2 COMPLEXES 40, 41 and 42.

Alrewas (fig. 29) - In the Tame valley running south from Alrewas for circa 3 km on SK 11 SE, was a very coherent multi-phase (Iron Age?, Romano-British?) landscape with several enclosures, many containing hut circles, strung out along an arterial trackway. There was a potential villa and a number of small ring ditches which could have been barrows rather than hut circles and a Medieval saltern. Two triple-ditched dykes (Iron Age?) ran parallel with each other towards the river with between them, a pit-defined track. At the north end a large settlement complex had been destroyed by quarrying, leaving in isolation a sub-circular, triple-ditched feature. This landscape is equivalent to COMPLEX number 18.

Elford (fig. 30) - Also on SK 11 SE and separated by the river from the south end of the landscape above (Alrewas) was a small but densely populated area of pit-alignments, other linear features, enclosures and hut circles. This area forms the bulk of COMPLEX number 11.

Heather (fig. 31) - Spread over a spur at the end of a locally prominent ridge to the west of Heather on SK 31 SE, were several round-cornered rectilinear enclosures, various linear features and fragments of pit alignment. Nearby on a smaller spur was a handful of ring ditches and other linears the whole picture suggesting several phases of activity. This landscape is encompassed by COMPLEX number 156.

Swarkestone (fig. 32) - the landscape around Swarkestone in the Trent valley on SK 32 NE, contained a barrow cemetery (Bronze Age), a large settlement (Romano-British), Iron Age linear features, several unusual enclosures, pit alignments and a double-ditched octagonal enclosure. The two maps to the west (SK22NE and SK32NW) also cover part of the Trent valley and are known to contain several crop marks but were not part of the project area. It would be advisable to assess this wider context before carrying out further analysis of the Swarkestone landscape. The Swarkestone area is encompassed by COMPLEX number 165.

5 CONCLUSIONS

The archaeology of the project area produced very few surprises, although the MORPH2 database will add circa 1000 records (see note below) to the NMR. This is largely because there are many site types which were not previously within the sphere of interest of either the NMR or the county SMRs. All the Twentieth century military features and most of the industrial sites fit into the "not previously recorded" category. (see "MORPH2 ONLY" column in the table below)

This table lists the number of MORPH2 SITES with/without NMR and/or SMR numbers entered in the relevant fields, and presents the results in PERIOD order. The right hand column lists the total number of sites for each period.

Period	NMR	SMR	NMR& SMR	MORPH2 ONLY	ALL
NE	2	2	2	1	3
BA	28	55	22	11	72
IA	19	57	19	16	73
RO	34	85	34	17	102
UP	98	214	91	61	282
EM	3	2	2	9	12
LM	57	55	38	286	360
PM	176	112	34	665	919
MO	2	2		59	63
UM	39	90	26	151	254
U	40	112	36	129	245
TOTALS	**498**	**786**	**304**	**1405**	**2385**

As already stated in the Industrial section 4.1.5, the number of industrial sites recorded from the aerial photographs was disappointing. It should be emphasised that this was not due to a methodological problem, or to the quality of the photographic coverage, but was the result of the continuous process of industrial growth (particularly coal mining), only recently halted, which has effectively erased most of the evidence of its origins. Not all of the early industrial evidence was beyond recovery as the extensive areas of Medieval coal shafts recorded by the project show (see 4.1.5).

5.1 RECOMMENDATIONS

It is recommended that future reconnaissance should be targeted with reference to the project transcriptions. This is particularly necessary in the river valleys, where many of the apparent gaps and blank areas between the often spectacular and regularly photographed crop-mark sites will reward regular observation. The general lack of specialist photography outside the river valleys must also be tackled; even known earthwork sites like the moats had virtually no available specialist photography. The industrial remains obviously need to be recorded in some detail since the demise of the coal mining and related industries signals the beginning of extensive industrial landscape reclamation.

Gravel and sand extraction is still an expanding threat to much of the archaeology of this area and an up-to-date quantification assessment of the destruction that has

taken place since the date of the most recently available photography used by this project, would help to sharpen the focus of reconnaissance priorities.

Rapid field survey will always be a desirable follow up to projects such as this and has already been carried out for the National Forest, following a brief to check surviving earthwork sites. The report on the results of this exercise were not available at the time of writing this report.

As a possible new class of monument the polygonal enclosures discussed in 4.1.8 merit more detailed survey using computer aided plotting techniques.

6 BIBLIOGRAPHY

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Robertson, D A 1992. The Navan Forty Metre Structure: Some observations regarding the social context of an Iron Age monument. Emania 10, 25- 32. Belfast

RCHME 1993. MORPH2: User's Guide (internal draft document)

RCHME 1994. The National Mapping Programme: Guidelines and Specification Manual

RCHME/EH 1992. Thesaurus of Archaeological Site Types. London

7 APPENDICES

7.1 SOURCES CONSULTED - AIR PHOTOGRAPHS

Source A NMR - Air Photographs (formerly NLAP)
RCHME
National Monuments Record Centre
Kemble Drive
Swindon SN2 2GZ

Verticals	Loan number	Date
	JEW/92/9/612	29/09/92
	JEW/92/9/612K	08/01193
	JEW/9312/1143K	01103/93
	JEW/93/4127K	28/04/93
	JEW /93/51227K	22/06/93

Specialist (obliques)

	JEW/92/9/612K	22/09/92
	JEW/92/9/6122	23/09/92
	JEW/92/9/6123	23/09/92
	JEW/92/9/612	14/12/92
	JEW/9312/1143	10/03/93
	JEW/93/4/27K	26/04/93
	JEW/93/5/227	08/06/93

Detailed listings for each NLAP loan are held as part of the project archive.

Source B University of Cambridge
Committee for Aerial Photography
Mond Building
Free School Lane
Cambridge CB2 3RF

Detailed listings of all CUCAP photography used by the project form part of the project archive. CUCAP holds verticals of the Trent valley but these were not accessed by the project.

7.2 SOURCES CONSULTED – OTHER

see 7.6 for Sites and Monuments Records addresses.

Ordnance Survey first and subsequent edition six-inch scale sheets maps, annotated by the Keele office with temporary NMR numbers (see 3.1.1). Complete cover was not available for any single edition, however the most complete and most useful from the transcription point of view were the first edition sheets. Index sheets for all maps used by the Keele office are included in the project archive.

(N .B. The National Trust have conducted detailed surveys of the industrial complexes on the Calke Abbey estate but these were not used by the project. Address at 7.6).

7.3 MORPH2 DATABASE AND ARCHIVE DETAILS

MORPH2 Databases - The hardware and software specifications used for the National Forest Project are those set out in appendix D of the MORPH2 USER'S GUIDE. A detailed description of the structure of the MORPH2 databases can be found in appendix C of the same document.

Path = C:\USR\DBASE\FOREST

Database		Size	Last update	Time	Records
PRI	.DBF	346915	17/01/94	09:48	2385
ENC	.DBF	71896	04/08/93	14:37	578
LFO	.DBF	148898	02/08/93	14:51	1324
LSO	.DBF	14394	24/02/94	13:53	166
MCO	.DBF	21706	21/02/94	17:04	314
INO	.DBF	1969	15/07/93	09:00	3
GRI	.DBF	52264	13/12/93	15:07	1239
ENT	.DBF	4938	02/08/93	11:57	104
GROUP	.DBF	12083	16/03/94	16:54	275
GROUP	.FPT	27444	16/03/94	16:54	121

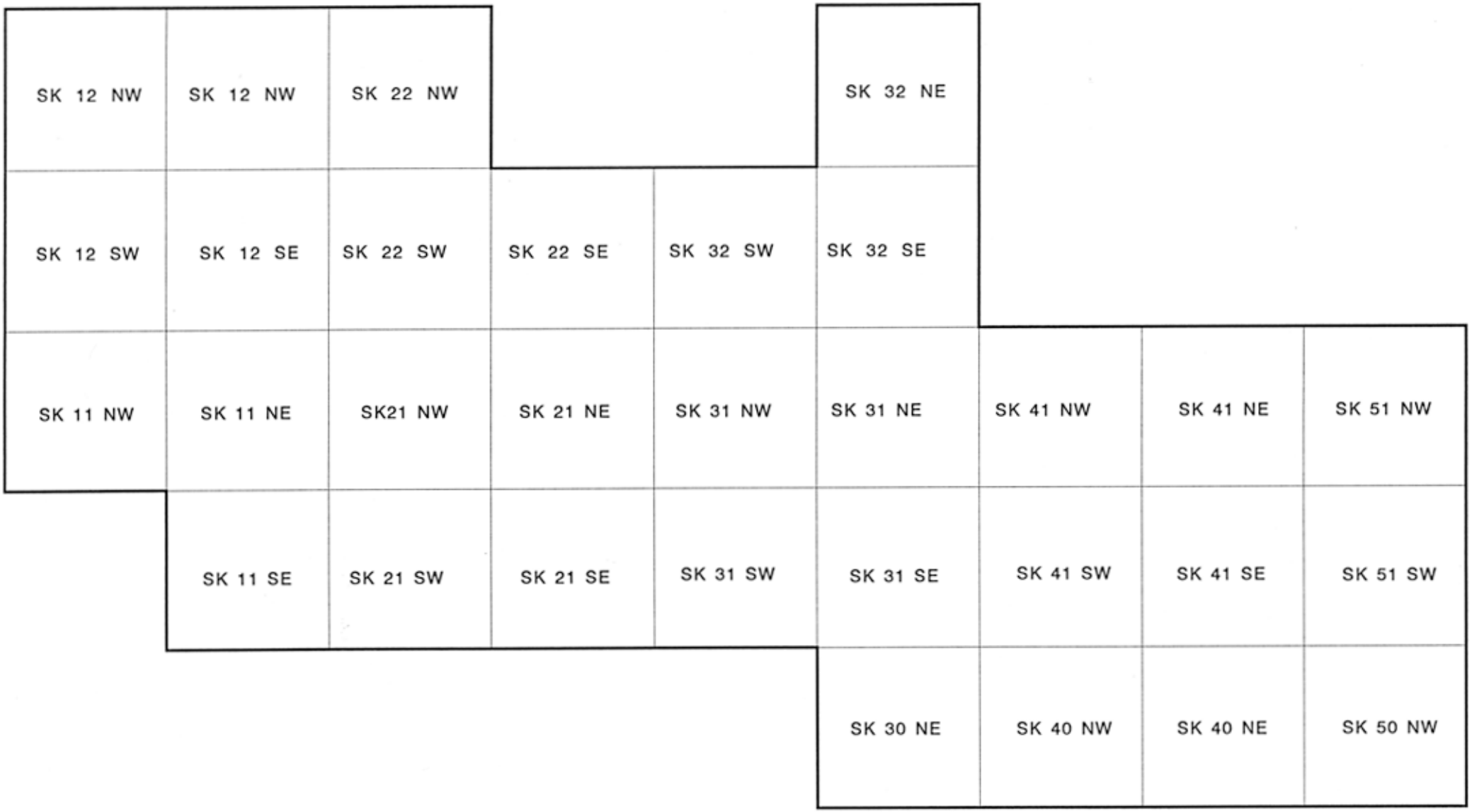
Total = 701507 bytes

MAPS database - C: \FOX\NMP\FOREST\MAPS. This database was used to monitor transcription progress and to record quantification data for each map. This database records the author, the date completed and the number of days taken to complete each map as well as numbers of NMR records, SMR records and numbers of photographs from various sources. The quantification details were only noted for the specialist photography, no detail being recorded for the vertical resource.

Archive - All paper and digital records will be curated by NMR Archive section as part of the RCHME: National Forest Project (Collection UID: 924085. Event UID: 924111). The following items, relating to the air photograph transcriptions, will be archived:

a - Digital copy of MORPH2 database
b - Digital copy of MAPS database
c - Original inked aerial photographic transcription overlays, one for each of the 31 1: 10,000 maps listed in appendix 7.4.
d - Original pencil working transcriptions, also one per map listed in appendix 7.4.
e - Map Note sheets as described in appendix 7.5, also one per map listed in section 7.4.
f - Project design.
g - Project specification.
h - The RCHME National Library of Air Photographs loan listings for oblique and vertical photography.
i - Various lists and correspondence relating to photography accessed from the Cambridge University Committee for Aerial photography library.
j - RCHME Air Photography Unit internal quarterly reports for the project.
k - Miscellaneous items of correspondence.

7.4 MAPS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SK 12 NW
SK 22 NW
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SK 32 SE
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SK 11 NE
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SK 21 NE
SK 31 NW
SK 31 NE
SK 41 NW
SK 41 NE
SK 51 NW
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SK 41 SE
SK 51 SW
SK 30 NE
SK 40 NW
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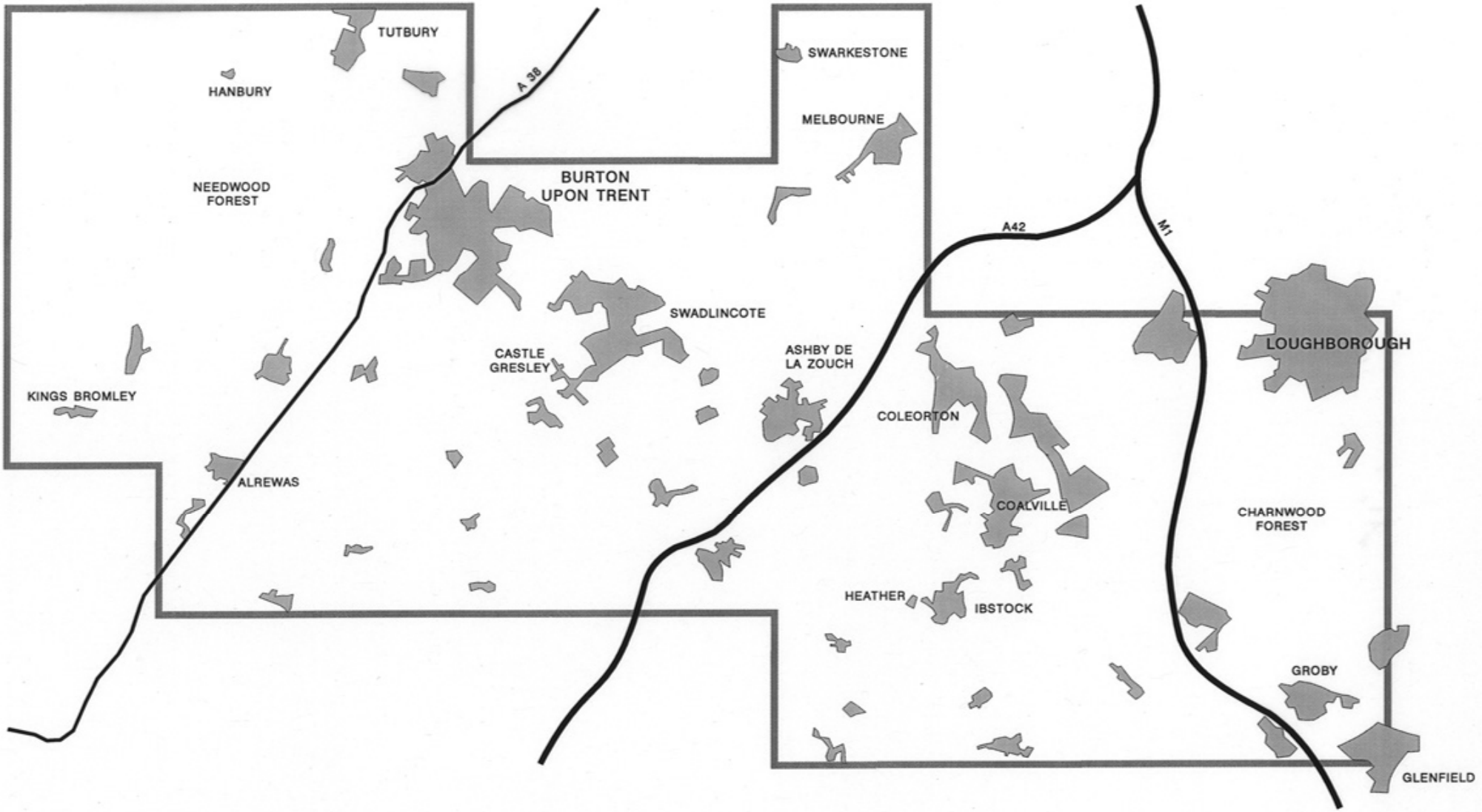
SK 50 NW



RCHME: National Forest Project. Urban areas and villages. This overlay fits all "full area" illustrations.

7.5 MAP NOTE SHEETS

CONTENTS

Extract from: RCHME 1994. The National Mapping Programme: Guidelines and Specification Manual. (draft copy)

Copy of map note sheet guide lines

Sample Map Note sheet.

6 MAP NOTE SHEET GUIDELINES

The Map Note Sheet (NMS) MUST accompany every 1:10,000 overlay produced as a part of the National Mapping Programme. It gives the air photo interpreter an opportunity to highlight or supply additional information not appropriate to the overlay or database. It is also intended to assist further surveys (air or ground) for any area. This aspect is important for future reconnaissance projects and Rapid Identification Surveys which aim to identify:

6.1 surviving earthworks and to provide up-to-date management information on them,

6.2 earthwork sites which appear problematical on the air photographs,

6.3 those areas where there was no or poor air photo coverage.

Notes to aid the use of MNS:

6.4 At the right-hand side of the sheet are boxes for the essential information: Map Sheet Number, Author/Air Photo-Interpreter's name, and Date Of Completion: all of them must be completed

6.5 Beneath them are two diagrammatic boxes, one to show the relationship of the map to the O.S. 1st. edition map (if being used on the project), the other to note where detail continues onto adjacent maps; this can be simply noted by arrows in the appropriate direction; authors of adjacent maps should check these before making edge comparisons.

6.6 Each Map Note Sheet provides a blank grid representing the O.S. quarter sheet divided up into 1 km. squares. Areas and individual sites can be marked up here, labelled with a letter which will refer to the comments made in the "comments" space.

6.7 Reference letters marked on the grid should be placed in the boxes beneath the grid which are labelled to indicate different land-use types, different types of feature, and different types of available photography. It is not necessary to place the letter in a box on every row, a box should contain more than one letter and a number of similar sites may be given the same letter. Some boxes are unlabelled, to be used as required

6.8 In the lower half of the sheet there are three sections which allow written comment.

6.8.1 Illustrative photographs:

This gives an opportunity to note the reference number of any photograph which is particularly helpful for illustration, exhibitions, teaching and interpretation (accompanied by the reference letter for the site or area shown on the grid, to which it refers).

6.8.2 References:

This gives an opportunity to note the existence of any additional sources of information used e.g. publications or field surveys.

6.8.3 Comments:

This gives an opportunity to write any remarks about any of the features already marked within the grid or to make any general comments relating to the sheet.

Examples of the kind of items that should be noted are:

i) extant earthworks
ii) areas where photography is very limited, of poor quality or none existent
iii) areas where features may be masked by cloud cover or dense shadow on the photographs or by dense vegetation or woodland
iv) particular features or areas of interest or importance which may not be immediately obvious from the overlay or database
v) features or areas which gave particular problems of interpretation
vi) if an NAR record cannot be identified on aerial photographs (and give reason why).

6.8.4 Sources:

The Map Note Sheet provides a check list of all the sources both photographic and archival which are relevant to the project. These boxes should be filled in with the date that they were consulted, and the appropriate reference numbers given for the photographic loans.

7.6 STATUTORY BODIES

Derbyshire County Council
County Planning Officer
County Offices
Matlock
Derbyshire DE4 3AG

Leicestershire County Council
Museums, Arts and Records Service
96 New Walk
Leicester LEI 6TD

Staffordshire County Council
Department of Planning and Economic Development
County Buildings
Martin Street
Stafford STl6 2LE

National Forest Development Team
Stanleigh House
Chapel Street
Donisthorpe
Swadlincote
Derbyshire DEl2 7PS

The National Trust
East Midlands Regional Office
Clumber Park Stable Yard
Worksop
Nottinghamshire S80 3BE

7.7 CONVENTIONS

CONTENTS

Extract from: RCHME 1994. The National Mapping Programme: Guidelines and Specification Manual. (draft copy)

Mapping conventions guidelines

Examples of 1: 10,000 mapping conventions.

VI Methodology

Mapping Conventions

The NMP will use information derived from aerial photographs to produce sketched transcriptions on translucent plastic overlays at a scale of 1: 10,000 accompanied by a digital, descriptive record. -

The overlays are not intended for publication.

Inked Conventions.

0.1 Within the limitations of scale, the archaeology will be depicted "as seen" with emphasis placed on the accurate representation of feature shape (including variable line thickness) and whether a feature is "cut" (see 5.1) or "built" (see 5.3).

0.2 Most large area features (maculae) need only be shown in outline. Flat area features which are not Compacted or made stone surfaces/spreads (5.7), may be depicted using the Extent of feature line (5.10). For negative features Extent of feature line is replaced with simple hachures (5.8). For positive features interpreted as spoil/waste dumps the Extent of feature line encloses an open stipple (5.9). Area features such as cairns or windmill mounds should be drawn as for Stone and/or earth banks/mounds (5.3)

N.B. do not confuse Extent of feature with Extent of area (see 2.4 and 5.14).

0.3 Very small area features can be depicted in solid black (see 5.7).

0.4 Extent of area marks the limit of an area of activity not the outline of a specific feature (see 2.2). Features associated with the activity may be drawn using the appropriate conventions (e.g. key structures in a mining complex or the runways of an airfield).

0.5 In order to preserve their shape, very small enclosures are better depicted with a solid line, regardless of whether they are "cut" (see 5.1) or "built" (see 5.3).

N.B. The MORPH record will describe the feature more fully.

1 Hachures.

1.1 Hachuring is not usually practical for three dimensional linear features at this scale (including enclosure banks and ditches) but "T" hachuring may be used for very substantial banks.

1.2 "T" hachuring is primarily used to outline larger negative maculae (e.g. quarries and pits. see 5.9) but must not be taken as indicative of depth or degree of slope.

1.3 The line of hachures may be left open to represent a cut face or slope (5.9).

2 Brand-name transfer materials.

2.1 The use of self-adhesive and dry transfer materials is not practical at 1:10,000. Experience has shown that such materials are too fragile to withstand the considerable amount of handling that the overlays are subject to during and after a project, subsequently all final drawing should be done by hand including areas of stippling.

2.2 The archive quality of these materials is not assured and would in part depend on the method of storage used for the overlays (e.g. vertical file or plan chest).

3 Labels.

3.1 There is no use of labelling within the mapped area since all additional information on interpretation and form is contained in the accompanying MORPH record.

3.2 An RCHME standard information box will be printed on each overlay. The box will carry information such as author and project title.

3.3 The policy of "archaeology only" within the mapped area is also dictated by the future requirement (GIS) that the transcriptions are capable of being digitally copied.

4 Pens and materials.

4.1 Overlays for inking will normally be of 125 micron (.005") polyester, pre-printed to RCHME standard. Non-standard overlays must be of dimensionally stable polyester film of at least 75 microns (.003") thick. Non-standard overlays must be accurately drawn to 1: 10,000 scale, <u>not</u> traced from unstable paper base maps.

4.2 Inking should be done directly onto a clean overlay not on the pencil version.

4.3 The ISO .18 pen should be used for all conventions except the <u>extent of area</u> line which should be drawn using a .25 pen.

4.4 Use an ink designed for drawing on plastic film (e.g. Rotring F type ink).

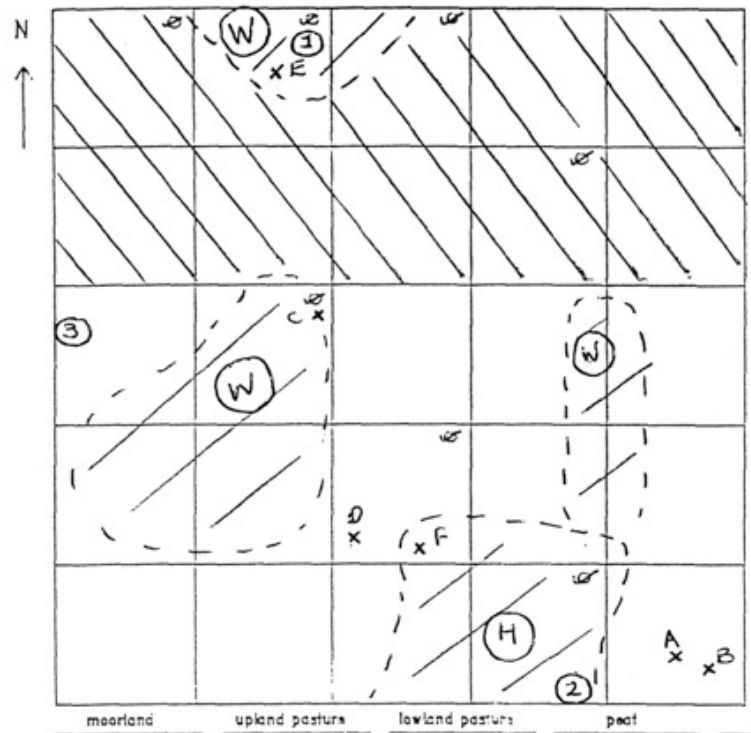
ROYAL COMMISSION ON THE HISTORICAL MONUMENTS OF ENGLAND

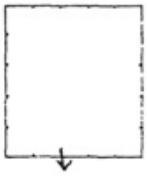
Air Photography Unit

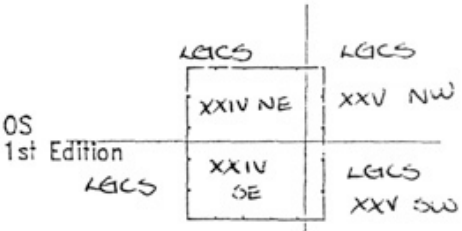
Map sheet number

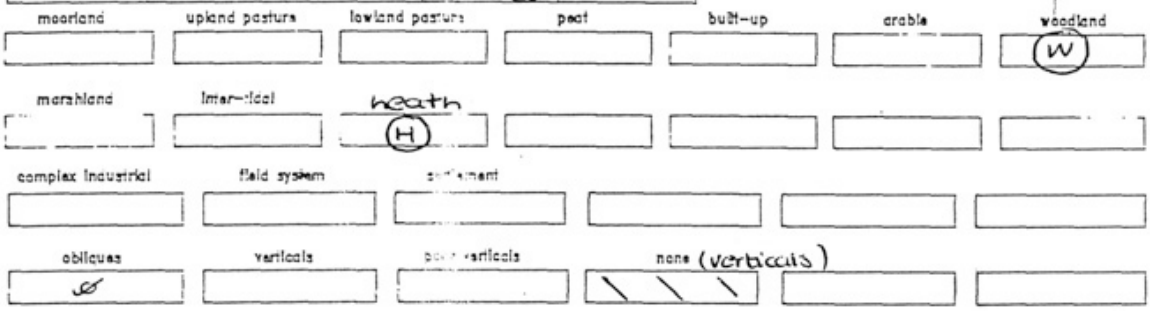
SK 51 SW

Author	Date
ANTONIA KERSHAW	28/7/93









Illustrative photos :- Bronze Age hillfort [FR.229.1.1] ① ATY 74+75 (CUCAP) SK 5014/1, 5014/2, 5114/1

Track = C SK5112/1

[FR.224.1.] ← Bradgate Gardens ② SK 5310/1, 5310/5

Ulverscroft Priory + fishponds ③ BHI 39/40 (CUCAP)

References :- [FR.210.3.]

Comments :-

SK 545104 = A = dark circular features near the reservoir, probably grubbed out trees, not drawn.

SK 548103 = B = long ditch through several fields with branches off it, likely to be agricultural or drainage, not drawn.

SK 519129 = C = possible tracks could be agricultural or geological, drawn. [FR.227.2.]

SK 522113 = D = series of linears, likely to be geological, some drawn [FR.223.4.1]

SK 516145 = E = near the Bronze Age hillfort (Beacon Hill) is a small number of military hut foundations, however, the date of the photograph is unknown, therefore, we don't know when these buildings went out of use, they were not drawn.

SK 527112 = F = there are several banks in this area, they are probably terraces caused by faults in the underlying geology (diorite) however, they need further investigation in the field before they are dismissed.

ROYAL COMMISSION ON THE HISTORICAL MONUMENTS OF ENGLAND
Air Photography Unit

National Mapping Programme map sheet progress record

Project title NATIONAL FOREST	Map sheet number SK 51 SW	Author AK

Sources check list – enter dates consulted

Archival sources		Photographic sources		
/ /	NAR on-line	8/6/93	NLAP obliques	loan number JEW 93/5/227
/ /	NAR primary record update	22/6/93	NLAP verticals	loan number JEW 93/5/227K.
22/7/93	NAR record map	23/7/93	CUCAP	
/ /	county SMR	/ /	county	
/ /		/ /		
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Mapping progress

	date	days
transcription started	22/7/93	
transcription completed	27/7/93	3½
inputting started	28/7/93	
inputting completed	28/7/93	½
total number of days		4

5 1:10,000 MAPPING CONVENTIONS: National Mapping Programme.

5.1 Ditches; extant or plough-levelled. Variable Line thickness.

5.2 Leat, mill race. Arrow indicating direction of flow if known. Variable Line thickness. (Larger artificial water courses as ditches).

5.3 Stone and/or earth banks/mounds; extant or plough-levelled. Heavy stipple. Applies also to lynchets, other artificial slopes & wall foundations (not buildings. See 5.4)

5.4 Buildings. Unroofed.

5.5 Holloways and unsurfaced trackways not defined by other depicted features. (1mm dashes. Single line per track when braided).

5.6 Railway/tramway. (2mm spacing for cross-lines). This convention should be used even if the only visible remains are embankments/cuttings.

5.7 Compacted or made stone surfaces/spreads. Medium stipple. (e.g. Paved area, surfaced road, dressing floor).

5.8 Area features (small). (e.g. storage pits, grubenhauser, clearance cairns, standing stones) Drawn solid as seen (pit alignments can be stylised). Extant negative features should be drawn with "T" hachures if possible (see 5.9).

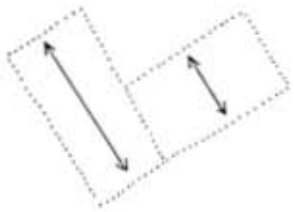
5.9 Negative features (large) extant or back-filled (0.5mm "T"). (e.g. quarries, fish ponds) Depict as solid if to small to hachure (see 5.8).

5.10 Spoil/waste dumps. (1mm dashes at 0.5mm spacing enclosing light stipple). (e.g. mining spoil heaps, saltern mounds) Applies to extant and levelled features. (On large features a 3mm band of light stipple within the dashes will suffice).

5.11 Extent of feature. (1mm dashes at 0.5mm spacing). A "hard" boundary marking the outline of a feature (e.g. used to outline runways of a disused airfield). Only use this when other conventions are inappropriate.

5.12 Pits or shafts. Including bell pits defined by a "doughnut" of spoil.

5.13 Ridge and furrow. Units are defined by dots (1mm spacing) if not bounded by headlands, banks or ditches or any other feature which has a specific convention. Double arrow to show shape and direction of rig.



5.14 Extent of area. (3mm dashes at 1mm spacing. Use .25 pen). A "soft" boundary marking the perceived limit of an activity (e.g. lead mining area. See 2.4).

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